Perspectives on Classifier Constructions in Sign Languages

Edited by
Karen Emmorey

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Preface

This volume is the culmination of work discussed and presented at the Workshop on Classifier Constructions held in La Jolla, California, in April, 2000. Research in the early 1980s suggested that *classifier constructions* can be analyzed as combinations of discrete morphemes, specifically, as predicates consisting of one or more movement roots along with several other morphemes encoding the shape or semantic class of object involved (indicated by handshape), the location of a referent object, and the orientation of the object. However, several critical questions have since arisen regarding the syntactic, morphological, and phonological analysis of these forms. Some researchers have suggested that these constructions do not actually involve classifiers in the usual sense of the term, may involve gestural (rather than morphemic) components, and may be unique to signed languages. To resolve some of this controversy, sign language linguists studying 13 different sign languages, experts in spoken-language classifier systems, and experts in gesture came together in La Jolla to participate in a workshop aimed at addressing these issues.

The chapters included in this volume discuss the following issues: (a) How sign language classifiers differ from spoken languages, (b) cross-linguistic variation in sign language classifier systems, (c) the role of gesture, (d) the nature of morpho-syntactic and phonological constraints on classifier constructions, (e) the grammaticization process for these forms, and (f) the acquisition of classifier forms. The organization of the volume follows the general format of the workshop. Each section focuses on a particular issue, and commentary chapters that discuss general questions, as well as comment on specific issues, are presented at the end of each section.

Because classifier constructions are universal to all sign languages encountered thus far, it is important to build a consensus on what counts as a classifier and to begin to document the nature and extent of cross-linguistic variation. In addition, the field needs to come to a consensus on terminology. Many have suggested that the term, classifier, is misleading and should be abandoned. However, the term is in widespread use among sign-language researchers, not to mention sign-language instructors, interpreters, and those in deaf education, and no other term has been generally accepted as a replacement. Therefore, the term, classifier, is retained in the title of this book and in many of the chapters, but the reader should be aware of the controversy surrounding the meaning of classifier for signed languages (see particularly the chapters in the section titled, "The Syntax and Morphology of Classifiers in Sign Languages").

The major goals of this volume are to bring to light critical issues related to the study of classifier constructions and to present state-of-the-art linguistic and psycholinguistic analyses of these constructions. It is hoped that by doing so, this volume will inspire more researchers to investigate the nature of classifier constructions across signed languages and to further explore the unique aspects these forms.

Finally, I would like to thank the National Science Foundation (Linguistics Program, BCS-9910717) for its support of the La Jolla Workshop on Classifier Constructions. In addition, the preparation of this volume was supported in part by a grant from the National Institute of Child Health and Human Development (HD13249).

—Karen Emmorey

I

The Syntax and Morphology of Classifiers in Sign Language

1

Rethinking 'Classifiers' in Signed Languages

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BACKGROUND

Australian Sign Language (Auslan) has a category of polycomponential (or "classifier") verbs of motion, location, handling and visual-geometric description (Schembri, 1996). Similar constructions have been identified in over thirty other natural signed languages.[1] In descriptions of these languages, the meaningful unit expressed by the handshape[2] in polycomponential verbs (henceforth PVs) has generally come to be described as a *classifier* morpheme, because the choice of handshape appears to vary according to the salient characteristics of the referent, especially its shape. This terminology was first introduced by ASL researchers, such as Frishberg (1975), Kegl and Wilbur (1976), and Supalla (1978), some of whom compared PV constructions to classificatory verbs in Athabaskan languages such as Navajo. The notion that PVs in signed languages contain classificatory morphemes has since gained widespread acceptance in the sign linguistics literature.

A small number of researchers, however, have argued against the analysis of these forms as containing classifiers (Cogill, 1999;Engberg-Pedersen, 1993; Engberg-Pedersen & Pedersen, 1985; Edmondson, 1990), or have raised questions about the use and usefulness of this terminology (Brennan, 1986; Deuchar, 1987; Johnston, 1991; Sutton-Spence & Woll, 1999; Zwitserlood, 1996). Drawing on recent research on a range of spoken and signed languages (Aikhenvald, 2000; Craig, 1994; Engberg-Pedersen, 1993, 1996; Grinevald,[3] 1996, 2000), this chapter shows how comparison between the handshape unit in PVs and classifiers in spoken languages is problematic. The typologies of classifier languages proposed by Allan (1977) and Grinevald (1996, 2000) will be compared and contrasted, particularly focusing on their differing accounts of the predicate classifier languages with which signed languages have been compared. This chapter suggests that, although these handshape units appear to have much in common with spoken language classifiers and other forms of nominal classification, they exhibit a cluster of distinctive properties that may make them a phenomenon unique to signed languages.

The primary goal of the present work is thus to provide a brief overview of recent developments in the study of nominal categorization systems in spoken languages and to encourage more detailed description and discussion of PV constructions in signed languages by attempting to sketch some of the issues that need to be considered.

Terminological Issues

Although there is a well-entrenched tradition in the sign linguistics literature of referring to handshape units as examples of classifier morphemes, descriptions of these complex constructions in different signed languages have used varying terminology to refer to the PV signs themselves. In Australia, they are generally known as *classifier signs* or simply *classifiers* (Bernal, 1997; Branson et al., 1995), whereas elsewhere they have been variously referred to as *classifier verbs* or *verbs of motion and location* (Supalla, 1986, 1990), *classifier predicates* (Corazza, 1990; Schick, 1987, 1990; Smith, 1990; Valli & Lucas, 1995), *spatial-locative predicates* (Liddell & Johnson, 1987), *polymorphemic predicates* (Collins-Ahlgren, 1990; Wallin, 1990), *polysynthetic signs* (Takkinen, 1996; Wallin, 1996, 1998), *productive signs* (Brennan, 1992; Wallin, 1998), *polycomponential signs* (Slobin et al., 2001), and *polymorphemic verbs* (Engberg-Pedersen, 1993).

Following Slobin et al. (2000), I prefer to use the term *polycomponential verb* to refer to this category of signs rather than alternatives such as *classifier predicate* or *polymorphemic verb*. This term is used because the claim that these forms include classifier morphemes is open to question, and the analysis of these signs as multimorphemic constructions is also problematic (Cogill, 1999). Although a subset of polycomponential constructions are clearly verbal in character, these constructions also include forms, which have also been described by other researchers as having an adjectival role (Schick, 1990). This appears to be the reason the term *predicate*, rather than *verb*, has been adopted by some researchers. I do not follow this practice, however, for two reasons. First, the term *predicate* has traditionally been used to refer to a constituent of sentence structure, rather than a lexical category (Crystal, 1991).[4] Second, it is possible that the adjectival type of polycomponential verbs is best considered a kind of stative verb. Engberg-Pedersen (1993) has suggested that we need more evidence before we can claim that this subclass of complex constructions actually act as adjectives (Engberg-Pedersen, personal communication, April, 2000). This is in keeping with the debate in the literature as to whether or not there is any evidence for the lexical category of adjective in signed languages (Bergman, 1983, 1986; Johnston, 1989). There does appear to be some support for a class of nonpolycomponential adjectives in Auslan**,** but this claim does require more investigation. Some nonpolycomponential signs that express adjectival meanings have most of the grammatical properties of verbs (especially stative verbs), but some appear to have some distinctive properties not shared by verbs. Nonpolycomponential signs such as RED or BIG, for example, may be modified by combining with premodifiers such as VERY and MORE, and may also be used attributively (i.e., they may appear before a nominal). It is not clear if the polycomponential signs of visual-geometric description that appear to have adjectival meanings, however, share these adjective-like properties. In any case, it is also not entirely evident that these properties are sufficient to suggest that such usages of nonpolycomponential signs qualify as adjectival. As a result, the inclusion of these forms in the category of verbs appears to be the most appropriate analysis, subject to later revision. I thus provisionally use *verb* as a superordinate term that includes both verbs of motion, location and handling, and adjectival-type constructions of visual-geometric description.

I have also chosen to refer to these forms as *polycomponential verbs* because much of the alternative terminology for these forms seems inappropriate. Labels such as *spatial-locative predicates* suggest that this class of signs exhibit a distinctive use of space, but the linguistic use of the signing space is a fundamental feature of many aspects of the morphosyntactic and discourse-pragmatic structure of signed languages and not unique to these constructions. Referring to these signs as *productive signs* is also not a satisfactory solution, as the term *productive* is usually used with reference to a specific grammatical feature or process, rather than a class of lexical items. Moreover, Liddell (chap. 9, this volume) has begun to question the actual extent of productivity in PVs. Similarly, the term *polysynthetic*, as Engberg-Pedersen (1993) pointed out, is one most commonly used by typologists to refer to a class of languages rather than a specific lexical category, and these languages have morphological characteristics which differ from those found in the complex verbs under discussion. The term *polymorphemic* is also not completely satisfactory, because it is usually used simply to identify any lexical item composed of more than one morpheme (i.e., not monomorphemic), and not in contrast to other more specific terms, such as bimorphemic (Crystal, 1991). Although Engberg-Pedersen (1993) appeared to overlook this ambiguity, it is clear that she did not intend to suggest that all other verbs in Danish Sign Language are composed of a single morpheme, as the discussion in the next section shows.

CLASSIFICATION OF VERBS IN SIGNED LANGUAGES

Verb forms in signed languages can be organized into types according to morphosyntactic criteria (see Fig. 1.1). Following Engberg-Pedersen (1993), I find it useful to categorize verbs on the basis

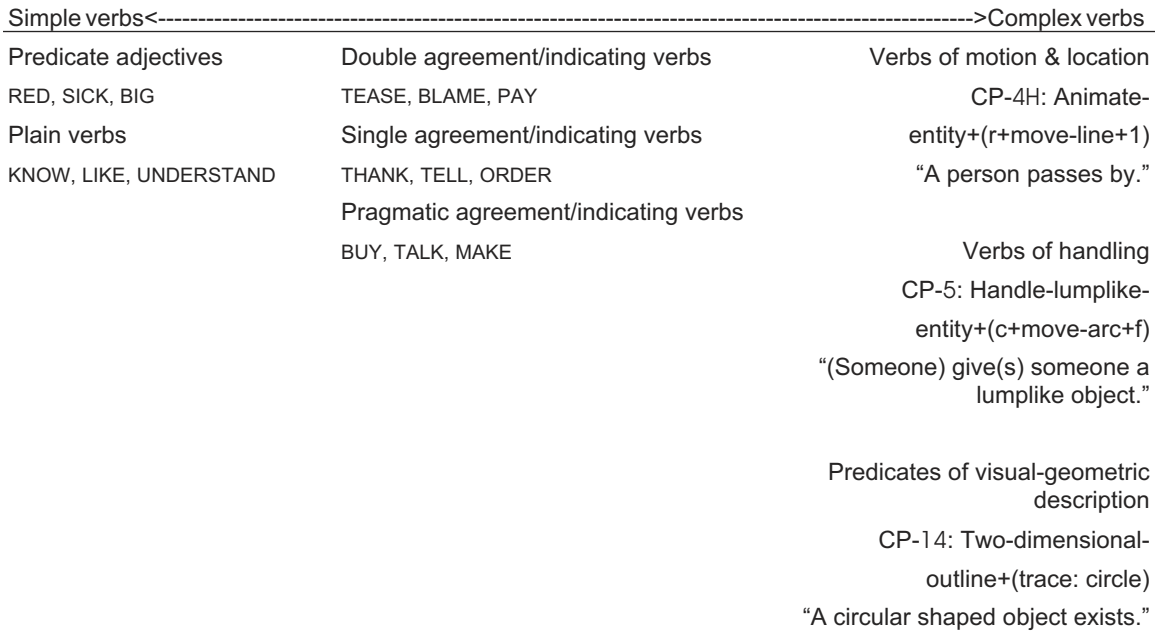

FIG. 1.1. Types of verbs in signed languages (with examples from Auslan).

of a distinction between modifications signaling degree, distribution, semantic agreement, and pragmatic agreement, and the spatial and movement modifications found in polycomponential forms (for an account of the distinction between semantic and pragmatic agreement, see Engberg-Pedersen, 1993). The main distinction suggested by Engberg-Pedersen (1993) is between polymorphemic and nonpolymorphemic verbs as prototypes at different points along a lexicogrammatical continuum and not between those forms that show subject and object agreement and those that signal locative relations, as first proposed by Padden (1988). The Engberg- Pedersen typology of verbs represents a useful alternative to Padden's (1988) classification of verbs into "plain," "agreement," and "spatial" verbs, which has been the source of some debate in the literature (Bos, 1990; Engberg-Pedersen, 1993; Johnston, 1991; Liddell, 1994, 1995, 2000; Liddell & Metzger, 1998). Many of the criticisms center around the claim by Padden (1988) that the functions of spatial loci found in agreement versus spatial verbs are distinct. She proposed that identical modifications to agreement and spatial verb signs (i.e., such as the movement from a locus near the signer to one near the addressee, as in the ASL signs r+GIVE+l and r+MOVE+l[5] shown in Fig. 1.2) are best analyzed as reflecting different grammatical constructions, despite the lack of any formal difference between the two. Her argument is based primarily on the differences in meaning. In a sense, this makes Padden's system of classification somewhat inconsistent. The difference between plain verbs on one hand, and agreement and spatial verbs on the other, does indeed reflect formal differences between the two in respect to their morphological use of space. But the distinction between the uses of loci in agreement and spatial verbs is not based on morphological differences, but semantic ones (Engberg-Pedersen, 1993).

The usefulness of Engberg-Pedersen's classification stems from the fact that it reflects clear morphological and semantic differences. Polymorphemic verbs differ from nonpolymorphemic forms in that only signs closer to the polymorphemic end of the continuum are characterized by the highly productive combination of a range of meaningful units denoting figure, ground, motion, location, orientation, direction, manner, aspect, extent, shape, and distribution. In contrast, the nonpolymorphemic verbs tend to have monomorphemic base forms, which in some cases can combine with up to three additional units of meaning, such as the spatial loci used to indicate semantic roles and distribution, aspect markers, and/or nonmanual adverbs. Fig. 1.1 shows how I modified Engberg-Pedersen's classification scheme by adopting terminology that avoids adopting the analysis of polycomponential verbs as multimorphemic constructions.

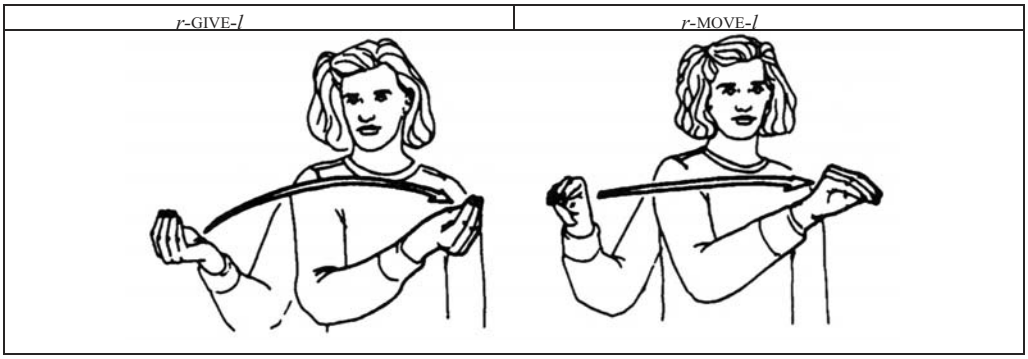

FIG. 1.2. The identical use of space in an "agreement" and a "spatial verb."

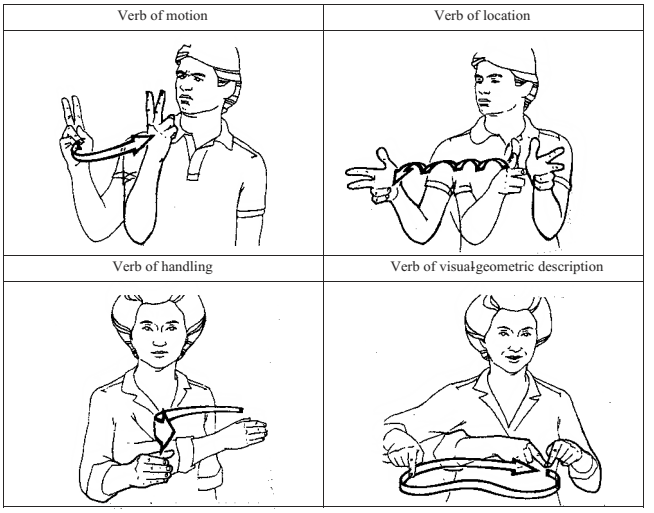

FIG. 1.3. ASL examples of complex verbs of motion, location, handling, and visual-geometric description.

Polycomponential Verbs

In previous work on Auslan, I have placed PVs into three subcategories: verbs of motion and location, handling, and visual-geometric description (Schembri, 1996, 1998). The same classification system appears to work equally well for other signed languages, as the following examples from ASL demonstrate (Humphries, Padden, & O'Rourke, 1980; see Fig. 1.3; handshape and orientation symbols are shown in Fig. 10 on page 27).

(1a) *Motion*
PV-5H:Animate-entity+(f+move-line+c) f+BAWL-OUt+c
"The two of them approached me and bawled me out."
INDEX+fl HAVE S-A-L-E PEOPLE PV-178Q:Animate-entities+(c+move-line+fl)
"There was a sale on, and lots of people rushed to it."

(1b) *Location*
PV- (lh) 68-Vehicle+(hold+l)
WOW BICYCLE PV- (rh) 68-Vehicle+(loc+distribution:in-a-row)
"Wow, there were bicycles lined up in rows."

(1c) *Handling*
__t__
GLASS PV->Q:Handle-cylindrical-entity+(c+move-arc+f)
"I hand the glass over to you."
_____t_____
TOMORROW TELETYPEWRITER PV-1>`:Handle-cylindrical-entity+(c+move-arc+f)
"Tomorrow, I'll give you the teletypewriter."

(1d) *Visual-geometric description*
PV- (lh) 49L: Two-dimensional-outline+(hold+l)
HOME HAVE TABLE PV- (rh) 49L: Two-dimensional-outline+(trace:kidney-shape)
"At home we have a kidney shaped table."
BED OLD HAVE PV-13Qd:Flat-surface+(trace:dip)
"The old bed has a dip in it."

In these forms, the phonological features of handshape, hand arrangement, orientation, location, movement and so forth (which do not form a "pronounceable" form on their own) have been analyzed by many researchers as separate morphemes that combine together to produce complex polymorphemic constructions. These forms have thus been viewed as distinct from monomorphemic lexical items, such as the Auslan signs SISTER, WHY and UNIVERSITY (see Fig. 1.4), where the individual phonological features may be considered meaningless (Schembri, 1996), or nonpolymorphemic verbs (such as Padden's class of agreement verbs), where a maximum combination of four morphemes (the stem plus up to three additional affixes) is possible (Engberg-Pedersen, 1993). Although morphemes in spoken languages are often realized as a bundle of features, single feature morphemes are not unknown. Examples of such morphemic units can be found in Japanese, for example, where palatalization is used to indicate "uncontrolledness," and the Bantu language, Chichewa, where the distinction between simple and recent past tense is signaled by modifications in tone (Brentari, 1990; Spencer, 1991).

(2) Japanese
(a) poko-poko "up and down movement"
(b) pʸoko-pʸoko "jumping around imprudently"

(3) Chichewa
(a) ndi-ná-fótokoza "I explained"
(b) ndi-ná-fótókoza "I just explained"

Like morphemic palatalization or tone, the morphemes in polymorphemic constructions must be produced in combination with other morphemes to create a pronounceable form. It is thus difficult to segment the meaningful components of polymorphemic constructions, unlike those in monomorphemic lexical signs and nonpolymorphemic verbs, into a root morpheme and affixes. Moreover, the morphological status of many of these components in unclear (Cogill,

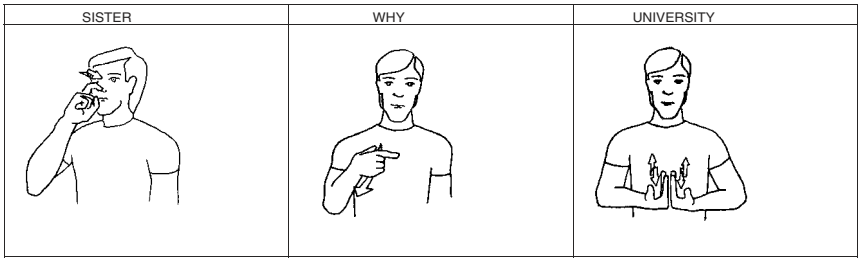

FIG. 1.4. Examples of Auslan monomorphemic signs.

1999, Liddell, 2000). Although the handshape unit in PVs has been traditionally analyzed as a morpheme, it can combine with a large number of other meaningful units that have not yet been entirely described for any signed language (Engberg-Pedersen, 1993; Liddell, 2000). A number of researchers have, for example, included in their proposed inventory of movement units a category of open-ended *imitative* or *analogue* morphemes to account for the fact that signers often incorporate types of movement into these constructions that closely imitate the motion contour and rhythmic features of the real-world event (Brennan, 1992; Engberg-Pedersen, 1993; Schick, 1990). In fact, the enormous number of possible movement types and available loci both in space and on the body that can be used in these forms has led to some debate about the linguistic status of these units (Cogill, 1999). Some sign linguists have suggested that the meaningful use of loci in these signs is based on nonlinguistic gesture and involves some fusing of linguistic and extralinguistic elements (Casey, 1996; Liddell, 2000; Liddell & Metzger, 1998). The relationship between the use of mimetic movement in signs representing the motion of people and objects and the imitative gestures of nonsigners has also been the source of some contention (Armstrong, Stokoe, & Wilcox, 1995; Schick, 1987, 1990; Singleton, Goldin-Meadow, & McNeill, 1995; Supalla, 1982).

Perhaps reflecting the difficulty involved in the linguistic description of these forms, there has also been little agreement about the different subclasses of handshape units in PVs, with different researchers suggesting very different analyses. McDonald (1982) proposed that there were only two basic categories, which she called *x-type of object* and *handle x-type of object* classifier forms. Johnston (1991), Shepard-Kegl (1985), Wallin (1996) and Zwitserlood (1996) also suggested a two-way division between forms that represent objects and those that indicate the handling of objects. Wallin (1996) and Zwitserlood (1996) appeared to exclude verbs of visual-geometric description from their descriptions, but most other researchers included them. McDonald (1982) placed them in the x-type of object category, and Johnston (1991) grouped them with handling forms. Other researchers, however, have greatly expanded the number of subclasses. As in my own work (Schembri, 1996), Schick (1987) suggested three main classes (*class*, *handle,* and *size and shape specifier* morphemes), but Engberg-Pedersen (1993) listed four (*whole entity*, *limb*, *handle*, and *extent*); Supalla (1986) suggested five (*size-and-shape-specifier*, *semantic*, *body*, *body part* and *instrument*); Corazza (1990) also proposed five (*grab*, *surface*, *quality*, *descriptive*, and *perimeter*); Brennan (1992) described six (*semantic*, *size-and-shape*, *tracing*, *handling*, *instrumental*, and *touch* morphemes); and Liddell and Johnson (1987) proposed seven classes of classifier morpheme (*whole entity*, *surface*, *instrumental*, *depth and width*, *extent*, *perimeter-shape*, and *on-surface* morphemes). The proliferation of categories and different terminology has prevented much needed crosslinguistic comparison of these forms, and only recently have researchers begun to call for more consistent descriptions across different signed languages (Zwitserlood, 1996). In Table 1.1, I drew on work by Zwitserlood (1996) to attempt to provide a unified account of these constructions in various signed languages, grouping the various types into three major categories: *entity*, *handle*, and *size and shape specifier* (SASS) handshape units. (For a discussion of this classification scheme and the various subcategories that can be recognized, see Schembri, 2001.)

Our focus here, however, is on the nature of the morpheme expressed by the handshape in these constructions. As explained, it has generally come to be described as a classifier morpheme, because the choice of handshape appears to vary according to the semantic characteristics of the referent. Frishberg (1975) discussed examples of verbs of motion and location in ASL, and appears to have been the first to use the term *classifier* to refer to the handshape unit.

TABLE 1.1

Classification of Classifiers in Signed Languages

	Entity Handshape Units	*Handle Handshape Units*	*SASS Handshape Units*
Supalla[6]	Statis SASSes, semantic, bodypart, some instrument classifiers	Some instrument classifiers	Non-static SASSes
McDonald	Some x-type of object classifiers	Handle x-type of object	Some x-type of object
Shepard-Kegl	Shape/object classifiers	Handling classifiers	–
Johnston	Substitutors/proforms	Some manipulators	Some manipulators
Corazza	Surface, some grab, perimeter, and some quantity (?) classifiers	Some grab classifiers	Descriptive, some perimeter and some quantity (?) classifiers
Brennan	Semantic classifiers and some SASSes	Handling, instrumental and touch classifiers	Tracing classifiers, and some SASSes
Schick	Class classifiers, some SASSes	Handle classifiers	Some SASSes
Engberg-Pedersen	Whole entity stems and some limb stems	Handle stems and some limb stems	Extension stems
Liddell & Johnson	Whole entity, surface, on-surface classifiers, and some extent (?) classifiers	Instrumental classifiers	Depth and width, perimeter-shape, and some extent (?) classifiers
Zwitserlood	Object	Handle	–

She had earlier published work on Navajo (Frishberg, 1972), but she did not explicitly compare these handshape units with classifiers in any spoken language. It was left to other researchers, such as Supalla (1978) and McDonald (1982), to draw an analogy between these forms in ASL and so-called predicate classifiers in the Athabaskan language family. There appear to have been a number of reasons for this comparison. First, sign linguistics was a new and rapidly expanding area of research at the time, and there was a strong need for standard terminology. Borrowing terminology from spoken language description seemed the most appropriate solution, perhaps because initial attempts to devise a sign language specific vocabulary, such as *chereme* and *cherology* for the visual–gestural equivalents of *phoneme* and *phonology* (Stokoe, 1960) had not met with much success.

Second, sign language researchers were also still struggling to overcome the assumption amongst their peers that only spoken languages were "worthy" of serious linguistic study (Armstrong et al., 1995). This is perhaps the motivation for what others have called the *test and transfer* approach to sign linguistics—findings about a particular phenomenon in signed languages were described in accordance with what was known about spoken languages (Uyechi, 1996; Zwitserlood, 1996). As this chapter attempts to show, the test and transfer approach to the study of signed languages can be useful, but its benefits may be limited when there is little consensus about the nature of particular findings in spoken language linguistics.

Third, a greater understanding of this area of signed language grammar was also sorely needed. The classifier morphemes described by Frishberg (1975) appeared to play a central role

in the derivational morphology of ASL. It has even been claimed that all signs in the lexicon of ASL include classifiers, or are derived from PV constructions that contain classifier morphemes (Kegl & Schley, 1986; McDonald, 1982; Shepard-Kegl, 1985), yet previous research had generally ignored this category of signs. Their apparent high degree of iconicity and variability meant they were considered paralinguistic phenomena (Hoemann, 1975), or it had been suggested that these forms were unlike anything found in spoken language because they appeared to vary in a nondiscrete and analogue fashion (DeMatteo, 1977, Mandel, 1977). Many sign linguists, however, considered these explanations based on visual form-meaning relationships to be "linguistically insufficient" (Wilbur, 1987, p. 169). As a result, the work of Supalla (1978, 1982) on PV constructions proved to be very influential. He was among the first to seriously investigate PVs and to claim that they formed part of a complex morphological system, similar to those found in polysynthetic spoken languages. Supalla's (1982) study of first language acquisition of ASL suggested that these forms appeared relatively late in children's development of grammatical skills, which he used to support his claim of morphological complexity.[7] Although the handshape units in these signs did appear to iconically reflect characteristics of the referent (especially its shape), Supalla (1978, p. 29) argued that these handshapes in ASL functioned "similarly to certain types of morphemes in spoken language which linguists have called classifiers." Supalla (1978), along with McDonald (1982), Schick (1990), and others drew on the description of classifiers in spoken languages by Allan (1977), which seemed to indicate that signed languages ought to be considered examples of predicate classifier languages.

Although ground-breaking, Allan's (1977) typology of classifiers in spoken languages has been the subject of considerable criticism in the more than two decades since its publication (Croft, 1994; Dixon, 1986; Engberg-Pedersen, 1993; Grinevald, 1996, 2000). Over this period, the study of classifiers has attracted the attention of a growing number of linguists, and the description of many previously undocumented spoken languages has provided new data. As a result, Grinevald (1996, 2000) proposed a revised definition and typology of classifier systems. Despite their relevance to our understanding of PVs in signed languages, these developments have remained largely overlooked in the sign linguistics literature. I thus present a brief review of Grinevald's (1996, 2000) work here. Before discussing her proposal, I provide a review of Allan's (1977) typology.

CLASSIFIERS IN SPOKEN LANGUAGES: ALLAN'S (1977) TYPOLOGY

Allan (1977) defined classifiers in spoken languages according to the following two criteria: "(a) they occur as morphemes in surface structures under specifiable conditions; (b) they have meaning, in the sense that a classifier denotes some salient perceived or imputed characteristic of the entity to which an associated noun refers (or may refer)" (p. 285).

Using this definition, Allan (1977) conducted a survey of the existing literature and drew up a typology of classifiers in spoken languages that grouped these morphemes into four categories. He illustrated the four types of classifier languages using a large number of examples taken from an impressively long list of primary sources. He admitted that the reliability of this data was variable because the bulk of it represented his own interpretation of data that appeared to mostly have come from descriptions collected by nonnative speaker field linguists working on a range of African, East and Southeast Asian, North-American and Australian languages, although the personal contributions of native speakers are acknowledged from languages such as Japanese and Luganda.

Numeral Classifiers. The first type discussed are the *numeral classifier* languages. This type of language represents the most common and most widely recognized classifier language. Here the classifier occurs as a compulsory part of a noun phrase. In English, noun phrases may include a demonstrative (e.g., *this*, *that*, *these*, *those*) and/or a quantifier (e.g., *one*, *four*, *some*, *any*, *few*). In numeral classifier languages, however, there is an additional free or bound classifier morpheme that must also be used in combination with the demonstrative and quantifier (and sometimes the adjective). In most numeral classifier languages, different classifiers will be used for different classes of noun. Some examples from Thai can be seen in 4(a) and 4(b).

(4) Numeral classifiers from Thai:
(a) dēk sáám khon
child three CL:HUMAN
"three children"

(b) sāmūt sáám lèm
notebook three CL:FLAT-OBJECT
"three notebooks"

Concordial Classifiers. The next category of classifier languages Allan (1977) illustrated are what he called the *concordial classifier* languages. Allan (1977) acknowledged that there is considerable disagreement about the inclusion of this language type in a typology of classifier languages. Many descriptions in the literature characterize these languages as having noun classification systems rather than classifiers per se. In concordial classifier languages, classifying morphemes are affixed (usually prefixed) to nouns and to their modifiers within the noun phrase, as well as to their predicates and proforms. Many African languages, such as Swahili, as well as Australian and Oceanic languages fall into this category. Because their status as classifier languages has been disputed, Allan's (1977) examples from the Bantu language Tonga are sufficient to illustrate this type:

(5) Concordial classifiers from Tonga:
ba-sika ba-ntu bo-bile
CL:PLURAL-HUMAN-arrive CL:PLURAL-HUMAN-man CL:PLURAL-HUMAN-two
"Two men arrive."

Predicate Classifiers. The third type of classifier language in Allan's (1977) typology is the predicate classifier type. It is this category of classifier languages that, as discussed, have been compared to signed languages. In the examples shown in (6) below, it is clear that part of the predicate construction meaning "something is lying there" is different in each case. These differences in the form of the predicate are explained by Allan (1977) as due to the inclusion of a meaningful element that reflects some aspect of the referent, whether it is part of the class of round objects, flat flexible objects, or objects in a pile.

(6) Predicate classifiers from Navajo:
(a) bèèsò s✐-§a
money PERF-lie: round-object
"A coin is lying there."

(b) bèèsò s✐-łtsÒÒz
money PERF-lie: flat-flexible-object
"A note is lying there."

(c) bèèsò s✐-n✐l
money PERF-lie: collection
"A pile of change is lying there."

Intralocative Classifiers. The final type considered by Allan (1977) are the intralocative classifier languages. In these languages, a classifier morpheme is affixed to the locative expressions that obligatorily co-occur with nouns in most environments. Allan (1977) can only offer three languages of this type: the South American language, Toba, the Australian language, Dyirbal, and Eskimo. He provides no primary data from the languages in question, but explains that these languages have a small set of classifier morphemes that are affixed to locative expressions with meanings like "up there," "out there," "visible and here," "visible and there," and "not in view."

Criticisms of Allan's Typology

In their review of Allan's (1977) typology of classifier languages, Engberg-Pedersen (1993) and Croft (1994) pointed out that one of the major problems with Allen's work stems from the fact that his definition of classifier is problematic. This is because he does not specify exactly what is meant when he refers to classifiers as "morphemes." This problem becomes most apparent when Allan (1977) attempted to set up a contrast between the so-called predicate classifiers in Athabaskan languages (as illustrated by the Navajo examples in (6)), and verbs in languages such as English. He does not consider English to be a classifier language, even though English possesses collective nouns, such as *stick*, *packet,* and *dozen*, which are very similar in meaning and function to some classifiers, such as the Thai classifier morphemes *muan, so* and *lo$*. In fact, these English collective nouns fulfil the criteria Allan (1977) listed in his definition of classifiers. He attempts to argue that they are not classifiers, however, because they are not obligatory in quantified noun phrases as they are in Thai.

Although it reveals the shortcomings of Allan's (1977) definition of classifier morphemes, his distinction between collective nouns and classifiers is a widely accepted one (Aikhenvald, 2000; Croft, 1994; Grinevald, 1996, 2000). Allan's (1977) analysis of the Athabaskan languages as predicate classifier languages has, on the other hand, been disputed by a number of writers (Croft, 1994; Engberg-Pedersen, 1993; Grinevald, 1996, 2000). Allan's (1977) own definition states clearly that classifiers are realized as separate morphemes, but the classificatory verbs of Navajo do not in fact contain a separate classifier morpheme (Grinevald, 1996). Each of the verbs shown in (6) consist of a root that cannot be subdivided into morphemes meaning "lie" and "round object," "flat flexible object," or "collection." The classifying element is so fused with the verb that the different forms simply have to be analyzed as examples of suppletion. Croft (1994) explained that, if we accept Allan's (1977) categorization of the Athabaskan languages as classifier languages, English could indeed be a possible candidate for inclusion in his typology:

> Given that English speakers can use…expressions such as *flow* 'move [liquid/particulate mass]' and *ooze* 'move [viscous material]', it could be said that English is also a classifying language…This is

> not absurd because none of the "predicate classifier" languages actually have separate classifier morphemes; instead they have distinct verb roots for the motion, location or manipulation of various object classes. (p. 159)

Moreover, Engberg-Pedersen (1986) pointed out that Athabaskan linguists do not in fact refer to the so-called predicate classifier verbs as classifiers at all, but as classificatory verb stems (Young & Morgan, 1987).[8]

In addition to the problems with Allan's (1977) definition of classifiers and his inclusion of Navajo as a predicate classifier type, his typology also appears to confuse true classifiers with other forms of nominal categorization. Dixon (1982) and Corbett (1991) suggested that a distinction ought to be made between noun class systems and classifier systems. As mentioned, there are morphosyntactic and semantic grounds for distinguishing between the two types of nominal classification.[9] Noun class systems (such as gender) ought not be considered examples of concordial classifiers (Dixon, 1982), because they actually differ from classifiers in a number of ways. First, they may show very little semantic motivation. Second, all nouns in these languages are assigned to a noun class. And third, unlike the use of classifiers, noun classification is obligatorily marked on a range of lexical classes (these vary from language to language and include adjectives, determiners, numerals, pronominals, predicates, etc.).

Grinevald's (1996, 2000) Typology

Recent attempts by Grinevald to construct a typology of classifier languages have responded to some of the criticisms of Allan's (1977) description and have excluded his two classes of concordial and predicate classifier languages (Craig, 1992, 1994; Grinevald 1996, 2000). Because Allan's definition of *classifier* remains problematic, Grinevald (1996) attempted to clearly redefine the notion of a classifier morpheme, and draw a distinction between classifier systems and other types of nominal categorization.

Classifiers and Other Types of Nominal Classification. Classifier systems, Grinevald (1996, 2000) claimed, are found in many languages of Asia, Oceania, Australia, Africa, and the Americas, but not in European languages. The latter group of languages does, however, exhibit classification phenomena that are related to true classifier systems (Aikhenvald, 2000; Craig, 1994). These include the grammaticalized *gender* or *noun class* systems in languages such as French (as in the following examples: *le* (masculine) *couteau* 'the knife' and *la* (feminine) *table* ('the table'), as well as the lexical *mensural* (or *measure*) expressions of English (as in *a piece of paper*, *a cup of milk*, *a handful of candles*, *a pile of clothes*). In the distinction between measure terms and classifiers, Aikhenvald (2000), Craig (1994) and Allan (1977) appeared to be in agreement. According to Craig (1994, p. 565), classifiers can be distinguished from noun class systems on one hand, because "they cover a greater variety of semantic domains," and from measure terms on the other because "they exist in other contexts beside quantification."

Another distinct category of nominal classification proposed by Grinevald (2000) are what she calls *class terms*. These are classifying morphemes that are involved in the processes of lexicogenesis in a language. They clearly derive from lexical items, but are involved in compounding processes in which they represent a class of referents. Examples from English would include *–berry* (as in *strawberry*, *blueberry*, *raspberry*, *gooseberry*, etc.), and *tree* (as in *apple tree*, *banana tree*, *orange tree*, *cherry tree*, etc.).[10]

A New Classifier Typology. Like Allan (1977), Grinevald (1996) noted that there is a great deal of variation in the use of terminology in this area of language description (compare, e.g., Grinevald's work with recent work by Aikhenvald, 2000). Engberg-Pedersen (1993) explained that some writers (e.g., such as Dixon, 1986) appeared to use the term *classifier* only for free morphemes that appear in noun phrases, while others (such as Mithun, 1986) used it to refer to nominals incorporated into verb complexes. Other researchers seem to use basic terms such as *noun class*, *noun classifier* and *numeral classifier* interchangeably (Grinevald, 1996). As is also true of signed language description (see above), there is a proliferation of terms that exceeds the number required for accurate classification of nominal categorization phenomena: *gender, class, noun class, noun marker, classifiers, class terms, number-, numerative-, relational-, genitive-, possessive-, verbal-, predicate-, concordial-, locative-classifiers,* etc.

In response to this terminological confusion, Grinevald's (1996) definition suggested the following four criteria for distinguishing true classifiers from related classificatory phenomena:

(a) Classifiers are overt morphemes.

(b) They constitute a morphosyntactic subsystem.

(c) They are semantically motivated systems of classification that do not classify all nouns.

(d) They are subject to discourse-pragmatic conditions of use.

Grinevald (1996) does not explain each of her criteria in great detail. The reasoning behind each of the criteria seems clear, however. Criterion (a), for example, works to exclude English expressions such as *flow* 'move [liquid/particulate mass]' and *ooze* 'move [viscous material]' because they do not contain a separate overt morpheme meaning something like "particulate mass" or "viscous material." Criterion (b) suggests that classifier morphemes must be intermediate between grammatical and lexical morphemes. Thus, English measure terms, for example, cannot be considered examples of true classifiers because they constitute a lexical system. Criteria (c) and criteria (d) clarify the difference between classifiers and noun classes. As we have seen, phenomena such as grammatical gender are sometimes not semantically motivated, and are obligatorily marked on all nouns. Their use is also not usually influenced by aspects of the discourse-pragmatic environment in which they occur.

In summary then, noun classes in French are excluded by criteria (c) and (d), English lexical measure terms by (b), and Navajo classificatory verbs by (a), (b) and (d). Grinevald (1996) thus appears to be substantially in agreement with Croft (1994) by suggesting that predicate classifiers appear not to be a category of classifiers at all.

Using this definition, Grinevald (1996, 2000) has suggested a new typology of classifier languages, based on the morphosyntactic locus of the classifier. This is very much work in progress, and she stresses that it is important to recognize that each type represents a focal point on a continuum, not a discrete category, and that additional types may be added as more data becomes available. Grinevald's (1996) typology recognizes four main classes of classifier morpheme in the languages of the world: (1) noun classifiers, (2) numeral classifiers, (3) genitive classifiers, and (4) verbal classifiers.

Noun Classifiers. The first classifier type, the noun classifiers, appears to be a category not identified in Allan (1977). Noun classifiers may be free morphemes that appear next to a noun. Grinevald (1996) suggested that they function as referent tracking devices, because they appear

to have a role not unlike determiners and also can be used pronominally. The Central American language Jakaltek is an example of a language with a noun classifier system. It appears to have an inventory of 24 classifier morphemes divided into systems that reflect the referent's social status (for deities and humans), or its physical and functional qualities (for nonhuman animates and inanimates). The following example from Grinevald (1996) illustrates the use of the classifiers *naj* 'male non-kin') and no§ ('animal'):

(7) Noun classifiers from Jakaltek:
xil naj xuwan no§ laba
saw CL:MALE John CL:ANIMAL snake
"John saw the snake"

Numeral Classifiers. The second category discussed by Grinevald (1996) are the numeral classifier type. This class is very similar to the numeral classifier category described in Allan's (1977) work, so I will not review them again here.

Genitive Classifiers. Craig (1994) explained that genitive classifiers are also known as possessive or attributive classifiers in the literature, and occur mostly in Oceanic languages. This class is exemplified by the Ponapean data shown below. The genitive classifier is a bound morpheme, affixed to the possessor noun while referring to the semantic class of the possessed noun. In Ponapean, the classes reflect functional categories, classifying the referent associated with the nominal as an edible or drinkable substances, for example, or as a vehicle, building, or piece of clothing. The two examples in (8) are the classifier *kene* 'edible substance' and *were* 'vehicle':

(8) Genitive classifiers from Ponapean:
(a) were-i pwoht
CL:VEHICLE-GEN1 boat
"my boat"

(b) kene-i mwenge
CL:EDIBLE-GEN1 food
"my food"

Verbal Classifiers. The fourth and last major category of classifiers described by Grinevald (1996) are what she refers to as verbal classifiers. In Craig (1994), she claims this type of classifier is found in indigenous spoken languages of North and South America, Australia, and in ASL. Grinevald (1996) explained that verbal classifiers are morphemes that appear inside the verb, referring to nominals outside of the verb form. She recognizes two subclasses: incorporated generic nouns that act as classifiers of referents, and classifying verbal affixes. Two examples of the classifying affix from Diegueño (*tu* meaning 'round object' and *a* for 'long object') can be found in (9) below.

(9) Verbal classifiers from Diegueño:
(a) tu-kat
CL:ROUND-OBJECT-cut
"to cut with a scissors or adze"

(b) a-kat
CL:LONG-OBJECT-cut
"to cut with a knife"

Although Craig (1994) included ASL in this category, she does not provide any data to support this claim, and she does not suggest to which of the two subclasses of verbal classifier languages it belongs. In later versions of her typology, Grinevald (2000) explained that more study of signed languages is needed to distinguish between true classifiers and class terms in signed language verbal constructions.

Minor and Hybrid Classifier Types. Grinevald (2000) made clear that the types of classifiers presented in her typology represent only the most widely recognized and best documented examples. There are a number of other possible subtypes, such as a *demonstrative classifier* type independent of the numeral type in some Amazonian languages, and a *locative classifier* that has been documented in the Argentinean languages Toba and Pilaga, but these remain to be fully described (Grinevald, 2000). New data coming from the indigenous languages of Brazil appear to show hybrid classifier types that combine aspects of the four classes described here (Aikhenvald, 2000). The data presented above also represent the most prototypical examples. Many languages have classifiers that blend features of each of these categories, and some also have classificatory morphemes that combine qualities of classifier systems and other forms of nominal categorization. I now turn to a discussion of PVs in signed languages and sketch some of the problems we encounter in attempting to define their relationship to classifier systems.

CLASSIFIERS IN SIGNED LANGUAGES?

The handshape units used in PVs in Auslan and other signed languages do appear to have some features in common both morphosyntactically and semantically with the classifier morphemes in the various languages discussed in Allan (1977), Craig (1992, 1994) and Grinevald (1996, 2000). Because the characteristics that handshape units and spoken language classifiers share have been well documented in the sign linguistics literature (Brennan, 1990; Collins-Ahlgren, 1990; Engberg-Pedersen, 1993; Schick, 1990; Supalla, 1978, 1982, 1986; Wallin, 1996; Zwitserlood, 1996), I do not describe them in detail here.

These signed language morphosyntactic systems also seem to have many morphological and semantic characteristics in common with Athabaskan classificatory verbs (for discussion of this point, see Engberg-Pedersen, 1993; McDonald, 1982). We have seen, however, that the comparison between Navajo and signed languages appears to be misleading. As already suggested, Navajo and other Athabaskan languages are perhaps not appropriately viewed as classifier languages at all.[11] It seems that those researchers who originally proposed that ASL should be included in this class accepted the data in Allan (1977) secondhand, believing that Navajo classificatory verbs included overt classifier morphemes. These researchers, such as Supalla (1978), were quoted widely in the sign linguistics literature, and, although recently a number of writers have begun to point out the error (Engberg-Pedersen, 1993; Schembri, 1998; Zwitserlood, 1996),[12] the description of ASL as a predicate classifier language (like Navajo) is still presented as unproblematic by many sign language researchers today (see, e.g., Sandler & Lillo-Martin, 2001).

If the claim that Athabaskan languages are predicate classifier languages is not clearly supported by the available evidence, what are the implications of this finding for signed languages

and the notion that PV constructions contain classifier morphemes? Are perhaps the classifier morphemes in signed languages more appropriately considered a type of verbal classifier, as initially suggested by Craig (1994)? Or do we need to create a new subcategory of classifier morphemes for signed languages in Grinevald's (1996) proposed typology? I do not pursue these issues here. I consider instead the possibility that the handshape unit in these constructions, although similar in form and function to other types of noun classification in the world's spoken languages, may not be examples of classifiers (in the strictest sense) at all.

This proposal is not new. Engberg-Pedersen (1993), for example, argued strongly against an analysis of PVs as including classifiers. She has shown how, at least in Danish Sign Language, the choice of handshape units does not serve a straightforward classificatory function. In verbs of motion, for example, the choice of handshape appears to be motivated by factors other than the class of referent (I discuss this in more detail below). She also based much of her argument on the widespread misunderstanding of the Navajo data and, like Grinevald (1996), pointed out the problematic nature and inconsistent use of the notion of classifier in the spoken language linguistics literature. But because Grinevald's (1996) new typology has, as I showed, attempted to clarify the terminological and typological confusion in the description of spoken language classifiers, perhaps our understanding of these units in signed languages can similarly benefit from comparisons with her work.

If we consider handshape units in PVs in relation to Grinevald's (1996) definition of classifiers, criterion (d) appears to hold true for this class of meaningful units in signed languages. Their use does indeed seem to be subject to discourse-pragmatic factors, such as signers' use of differing perspectives on the events they describe or variation in lexical choice due to register and discourse form, although these factors are not yet very well understood (Ahlgren & Bergman, 1990; Brennan, 1992, 1994; Valli & Lucas, 1995). In my own Auslan data, signers often have a choice between representing the motion of an animate with a lexical sign (such as FALL, JUMP, ROLL etc.) or a PV (Schembri, 2001). The motivation for different lexical choices in this area requires much more investigation, but we can assume that it at least partly reflects influences from the discourse-pragmatic environment (Engberg-Pedersen, 1993). It is not clear, however, to what extent criteria (a), (b) and (c) in Grinevald's (1996) definition apply to these forms.

Overt or Fused Morpheme(s)? I discuss criterion (a) first. In all of the examples from spoken languages discussed above, the classifier morpheme is a single, overt morpheme. In signed languages, however, many researchers have proposed that the handshape in PVs may itself be a morphologically complex unit rather than a single morpheme (Boyes-Braem, 1981; Engberg-Pedersen, 1993; Schick, 1987; Shepard-Kegl, 1985; Supalla, 1982, 1986; Wallin, 1990). Writers such as Schick (1987), Shepard-Kegl (1985) and Supalla (1982, 1986) suggested that each of the fingers and the thumb of the hand may act as separate morphemes in some entity, handling, and SASS handshapes. Supalla (1982) also discussed how other phonological features, such as the degree of bending or spreading of the fingers, may act morphemically. In the examples shown in Fig. 1.5, the bending of the fingers is used to refer to a warped, deformed, or damaged referent (referred to as the *wrecked affix* by Supalla). Wallin (1996) described how parts of the B (3Qd) handshape used to represent vehicles in Swedish Sign Language may be given morphemic status. In his proposed analysis, the tips of the fingers represent the front, the wrist the back end, and part of the hand between the front and back denotes the central part of the vehicle. Placing a second handshape unit near these submorphemes would thus signal spatial relations (such as "in front," "behind," and "on") be-

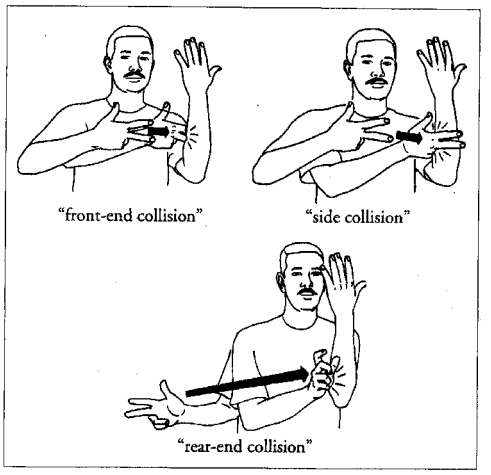

FIG. 1.5. ASL examples illustrating use of the "wrecked" affix.

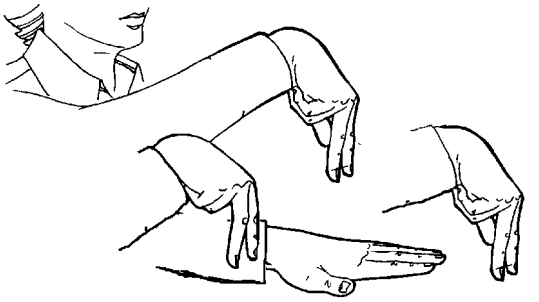

FIG. 1.6. Swedish Sign Language example.

tween the two referents concerned. This is illustrated in Fig. 1.6 but could equally well apply to the ASL examples in Fig. 1.5.

Not all researchers agree with these analyses, however. Brennan (1990) suggested that the handshape as a whole is a single morphological unit in British Sign Language (BSL), and attempts by Zwitserlood (1996) and Cogill (1999) to elicit grammaticality judgments from signers have not resulted in unequivocal evidence that all handshapes in these constructions are composed of several meaningful parts. If we consider the handshape unit a single morpheme, however, it is not apparent how we can explain the sources of spatial meaning seen in the Swedish Sign Language vehicle morpheme. On the other hand, if we accept the submorphemic analysis, it becomes unclear how exactly to segment proposed examples of multimorphemic handshape units, such as Wallin's (1996) example. How much of the central part of the hand represents the

central part of the vehicle? Precisely where do the proposed morphemes for "front end" and "back end" begin? It is not clear which parts of the handshape represent separate overt morphemes, and which are fused into some kind of portmanteau morpheme. And, if indeed it is possible to isolate discrete meaningful parts of the handshape, are each of these to be considered types of classifier morpheme, or some other kind of meaningful unit (see Liddell, chap. 9, this volume)? These issues remain largely unresolved.

A Morphosyntactic Subsystem? It is also not clear how criterion (b) of Grinevald's definition of classifiers applies to signed languages. This criterion seeks to differentiate classifier morphemes from lexical measure words and class terms on one hand, and from grammatical noun class systems on the other. Grinevald (2000) explained that classifiers are a morphosyntactic subsystem, placed at a middle point along a lexical-grammatical continuum. This also seems an appropriate description of the role played by the handshape unit in signed language PVs. Although PVs form part of a morphosyntactic system in signed languages, there appears to be a complex relationship between this system and the lexicon, with some researchers suggesting (as we have seen) that there is a morphological continuum between polymorphemic and nonpolymorphemic forms (Engberg-Pedersen, 1993).

In other ways, however, these forms seem to have more in common with Grinevald's proposed category of class terms (see *Classifiers and Other Types of Nominal Classification* on p. 14). Like class terms, handshape units play a central role in lexicogenesis in signed languages (Brennan, 1990; Johnston & Schembri, 1999; Schick, 1990). The handshape units in PVs can become part of lexicalized monomorphemic forms with highly specific, rather than general, meanings.[13] The monomorphemic lexicon of signed languages of Auslan appears to contain a significant percentage of lexical signs, sometimes known as *frozen signs*, which seem to have been derived from the PV forms I described (Johnston & Schembri, 1999). Many of these signs involve the use of handshapes that represent the movement of whole or part of the object, trace an outline of its shape, or imitate a handling action (see Fig. 1.7). Auslan lexical signs such as DISABLED, MEETING, PARK-CAR, and STIR-CRAZY appear to have been derived from the use of verbs of motion and location; the signs TICKET, PLATE, HOUSE, and TABLE resemble the use of various SASS forms; and BAG, SEW, DRIVE, SOCK, and DRINK seem to have developed from verbs of handling. Lexicogenesis does not appear, at least from the data presented in Aikhenvald (2000), Allan (1977) or Grinevald (1996, 2000), to be a major role of classifiers in spoken languages:

> Investigations of numeral and nominal classifier languages…have led researchers to suggest that, in general, classifiers are redundant and semantically empty (Craig, 1986; Denny, 1976, 1986). In many languages, speakers often use a more restricted set of classifiers in actual speech than exists in the language (Craig, 1986). Often, there are few options in classifier selection; the relationship between a referent and its corresponding classifier is frozen and idiosyncratic…it is clear that classifiers are not highly productive and do not play a major role in many languages. (Schick, 1990, p. 37)

Although Schick (1990) perhaps underestimated the diverse range of functions classifiers appear to serve in the world's spoken languages, Grinevald (1996, 2000) suggested that these forms appear to be semantically redundant. Aikhenvald (2000), however, rejected this claim, and pointed out that classifier morphemes have a number of functions, such as quantifying and individuating mass nouns, or supplementing the lexical content of nominals. Unlike classifiers, however, there is no dispute about the role of handshape units in PVs. These forms do not simply have a supplementary role in signed languages, but are instead at "the heart of word formation

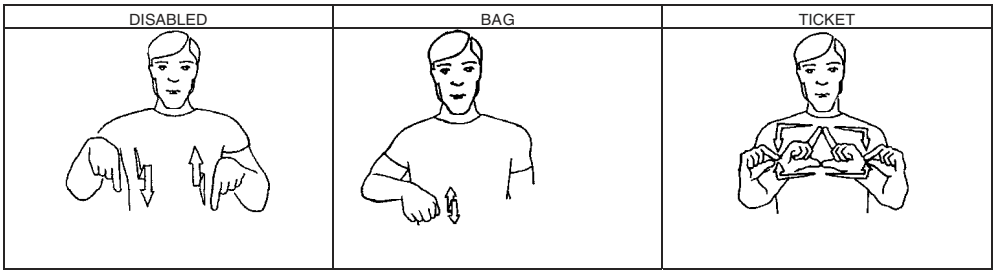

FIG. 1.7. Monomorphemic Auslan signs that appear to be derived from polymorphemic predicates of motion, handling and visual-geometric description.

devices and as such represent one of the most enduring aspects of language, the ability to create new lexical items"[14] (Schick, 1990, p. 37).

Criterion (b) is also problematic because, as we have seen, the precise nature of the morphosyntactic system, which includes PVs, is the source of some debate in the sign linguistics literature. If we wish to claim that, at least in some PV constructions, each phoneme or phonological feature is also a morpheme (Brentari, 1995; Wallin, 1996), then some writers have raised doubts about how we may maintain a consistent distinction between the two levels (Cogill, 1999; Engberg-Pedersen, 1996). In addition, we have to recognize that the inventory of formational elements (the use of particular movement patterns and vast number of possible spatial loci) used in PV constructions is larger than that found in monomorphemic lexical items and stems. As Wilbur (2000) pointed out, we know of no spoken language in which particular distinctive features are reserved only for morphological purposes and never surface in a lexical item. As previously mentioned, researchers such as Liddell (2000) have responded to this issue by arguing that aspects of the grammar of signed languages may involve some conflation of linguistic and extra-linguistic elements.[15] If we accept this reasoning, then this morphosyntactic subsystem may be not only intermediate between a lexical and a grammatical system (like classifier systems), but unique in its fusion of linguistic and visuospatial properties, and thus quite unlike anything we see in the world's spoken languages.[16]

What Do Handshape Units Classify? In criterion (c), Grinevald (1996) does not explain what she means by "classification," but my reading of her work suggests that she does not substantially disagree with Allan (1977). A classifier classifies in the sense that it denotes some salient inherent or perceived characteristic of the referent represented by an associated noun. Therefore, Engberg-Pedersen (1993) argued that the analysis of handshape units in PVs as classifiers can only be justified if we can show that the choice of these handshapes is determined by inherent or perceived characteristics of the referents, and not by anything else.

As mentioned, Engberg-Pedersen (1993) claimed that the choice of handshape does not depend solely on the attributes of the referent represented by an associated nominal. Instead, she points out that the choice of handshape and movement in these constructions in Danish Sign Language are mutually interdependent,[17] and that it is not clear how the morphological relationship between the two is most appropriately analyzed. In keeping with the wide agreement in the spoken language literature that classifier morphemes are always units separate from the noun or

verb root, Supalla (1982) and others described the movement feature of these forms as the root of the verb, and the classifier handshape as a type of affix. But McDonald (1982, 1983) and Engberg-Pedersen (1993, 1996) found that that there is actually little morphological evidence for this division between movement as root and handshape as affix. This claim does indeed seem odd given the fact that neither the handshape nor the movement is in any sense morphologically basic. Both are combined more or less simultaneously, and both are more or less unpronounceable on their own (McDonald, 1982; Schick, 1990; Shepard-Kegl, 1985). The distinction between notions such as root and affix becomes meaningless if the two terms are not used to describe crucial differences in how each of these morphemes combine with other morphemes (Mugdan, 1994). It seems that the root and affix analysis may be partly motivated by the description of the handshapes as classifiers, and the description of the choice of classifier as motivated by the characteristics of the referent and separate from the verbal meaning.

Although it is widely recognized that the choice of classifier in spoken languages is influenced by discourse-pragmatic factors (Aikhenvald, 2000; Foley, 1997; Grinevald, 1996, 2000), allowing the speaker a degree of choice and the possibility of reclassification, it seems that these different uses always reflect different perspectives on the characteristics of the referent represented by an associated nominal, as we can see in example (10) from Burmese.

(10) Burmese

(a) myi§ te san	river one CL-line	(on a map)
(b) myi§ te sin	river one CL-arc	(as a path to the sea)
(c) myi§ te khu	river one CL-thing	(in a discussion of river in general)

This is an area of classifier usage that has not, however, been very extensively researched,[18] so our comparisons with the handshape unit in PVs cannot be conclusive (Aikhenvald, 2000). It is not difficult, however, to show that while the choice of handshape unit is partially motivated by salient aspects of the referent, particularly its size and shape, this is not the only influence. I illustrate this with reference to the three major categories of PVs: verbs of handling, verbs of visual-geometric description, and verbs of motion and location in signed languages. The latter group appear to have been the first forms compared to classifiers in spoken languages (Frishberg, 1975; Klima & Bellugi, 1979; Supalla, 1978), and the class of handshape units most like the various types of spoken language classifiers described by writers such as Aikhenvald (2000), Allan (1977) and Grinevald (1996, 2000). In polycomponential verbs of motion and location, the handshape represents either an agent, patient, or theme participant role conflated with the verbal element, represented by handshape units that appear to be selected according to whether or not the referent falls into the class of animate beings or vehicles, for example, classes that are common in the world's classifier languages (Schick, 1990). The term *classifier* was, however, later extended to include the handshape units in other PVs. Yet, unlike the handshape in verbs of motion and location, the handshape unit in verbs of handling and in verbs of visual-geometric description appears to share relatively few characteristics with classifiers.

In handling verbs, the handshape unit has traditionally been analyzed as a classifier reflecting the size and shape of a referent acting in the participant role of patient or theme (or sometimes the instrument), but it actually only indirectly reflects these aspects of the referent (Zwitserlood, 1996). In fact, the choice of handshape appears to be influenced by two factors: (1) the part of the patient or theme argument that is handled, and (2) the characteristics of the agent's body part that is manipulating the patient or theme argument. The work of a number of writers, such as

Engberg-Pedersen (1993) and Wallin (1996), attempted to clarify the first of these two factors, explaining that specific handling handshapes (referred to as *agentive classifiers* by Wallin, 1996) are selected according to the part of the theme argument that is manipulated by the agent, and do not in fact always reflect characteristics of the theme itself: "Since the classifiers are chosen according to the part that is handled, and not according to the referent itself, the shape or size (or other property) of the referent…cannot be determined by the classifier" (Wallin, 1996, p. 125). In fact, the handshape usually only indicates the specific properties of the part of the referent that is handled. There are exceptions, however, as Wallin (1996) went on to explain:

> Normally it is a part which is constructed for handling…e.g. the handle on a travel bag or a wood-saw, the ear of a coffee mug or a jar lid. This, however, is not necessarily always the case…A coffee mug can be held in the same way that a normal drinking glass is held. A pen and a book lack a particular part that is handled. (Wallin, 1996, p. 124)

The handshape thus represents the characteristics of only part of the referent represented by the theme argument, or the referents associated with both the theme and agent argument. So, for example, if a pen is being held by a human who is using it to write, for example, then a signer would choose perhaps a curved baby O (:B) or an F (<) handshape to represent this action. However, if the agent is using the pen as a weapon, then the S (29) handshape might be selected by the signer as this more accurately imitates the handshape used by the agent. Similarly, if a nonhuman animate was manipulating the pen, such as an elephant with its trunk or an eagle with its talons, then the choice of handshape may be the forearm with the hand shaped into a flat O (;A) to represent the elephant's trunk, or a hooked W (<) (<êC) to mimic the appearance of an eagle's talons. The choice of handshape thus does not, in any real sense, only classify the theme argument. This is clear in the examples in Fig. 1.8. In each case, the change of handshape represents a change in the hands of the agent, and not a change in the size or shape characteristics of the patient. Unlike classifiers, the handshape unit may simultaneously represent two entities: the first entity acting as "handler" and the part of the second entity that is handled.

In verbs of visual-geometric description, the choice of the SASS handshape is based on salient characteristics of the referent, such as its relative depth and width. Thus, for a small round object, such as a coin or button, the F (<B) handshape might be used. For a medium-sized round object, the gC (=) handshape would be appropriate. An increase in the dimension of an object can be realized by the addition of fingers, so that the C (>) handshape would represent a medium-sized object of greater depth. In many of these verb forms, however, the handshape is not

FIG. 1.8. Examples of handling verbs.

used alone, but combined with a tracing movement that outlines the perimeter of the object. Without the movement, the same handshapes could also be used to signal the location of an object of a particular size and shape (i.e., it might equally belong in the class of polycomponential verbs of motion and location). The meaning and function of the handshape may, however, be quite different when the tracing movement is added (Zwitserlood, 1996). Thus, it is clear that the movement may be an inseparable part of the meaning of the construction. Although the handshape provides some information about the width and depth of the referent, it is the movement that outlines its size and shape. Indeed, it might be argued that the movement itself is a type of classifier because it, like the handshape, denotes some salient characteristic of the referent. This is where the comparison with spoken language classifiers begins to break down, however, because the function of these forms is not to classify the referent, but to give descriptive information about its visual-geometric characteristics. The handshape and the movement may both contribute to the meaning of these constructions, creating visually analogue adjectival predicates that have no parallel in any of the classifier systems documented in spoken languages.

In polycomponential verbs of motion and location, as already explained, the choice of the handshape appears to reflect semantic characteristics of the referent, such as whether it falls into the class of animates or vehicles. As in Danish Sign Language (Engberg-Pedersen, 1993), however, the different lexical forms that can be used to describe the motion and location of animates in Auslan also partly signal various aspects of the motion event, rather than being entirely motivated by the different classes of referent involved. Verbs of motion that can be used to describe human beings include lexical forms at one end of the morphological continuum, such as ARRIVE, LEAVE, SIT, RUN, and TRAVEL, and PV constructions using various types of handshape units at the other, such as the G (49H) and V (69L) handshapes (see Fig. 1.9). If an Auslan signer wishes to add more detail about the type of motion event, there are a range of handshape units for representing the movement of different parts of the body, such as the two-handed G (149L) for legs, the two-handed B (13Qd) for feet, and the S (29) for the head. One form involves the use of the S (29) handshape together with the lower arm to describe movements of the torso. Each of these handshape units can be found at different points along the lexicalization and grammaticization continuum, and thus they each have idiosyncratic meanings and behavior. They differ in the kinds of movement units with which they can combine, and in the various types of spatial arrangement in which they may occur, as the examples in (11) demonstrate.

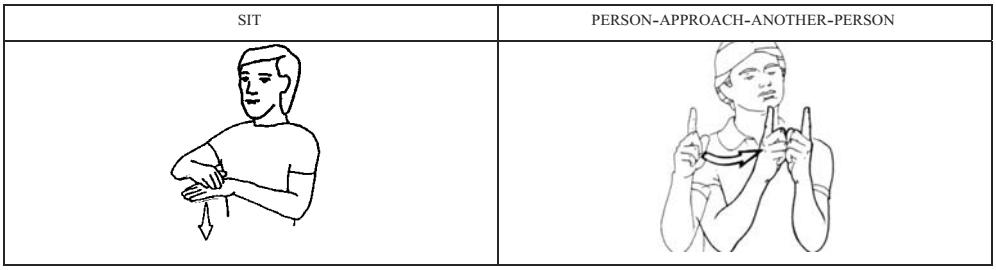

FIG. 1.9. Examples of motion verbs in Auslan—SIT and PERSON-APPROACH-ANOTHER-PERSON.

(11)

____t___

(a) WOMAN PV- 49H:Animate-entity+ (loc+f) MAN PV- 49H:Animate-entity+ (fr+move-line+fl)
"As for the woman, the man passed her by."

PV- (lh) 3Qd:Vehicle+ (loc+f)

(b) TRUCK BOY PV- (rh) PV- 69BQd:Legged-entity+ (on-back-of-left-hand+fall+c)
"The boy fell off the truck."

(c) GIRL SLOW PV- 149L:Leg+ (move-analogue: limp) PV- 49H:Animate-entity+ (f+move-line+c)
"The girl slowly limped toward me."

As in Danish Sign Language, there is a consistent tendency in Auslan signers to prefer the use of the V (68L) handshape for particular types of motion, such as falling, jumping, sitting, and lying. The G (49H) handshape is preferred for the description of someone approaching or passing the signer, or in verbs denoting two people meeting and leaving each other. The last example in (11) uses a construction that Supalla (1990) referred to as a *serial verb of motion*. The same motion event is described by two polycomponential verbs of motion, the first using a two-handed G (149L) to represent the manner of motion, and the second using the G (49H) handshape to describe the path or direction. The use of such serial polymorphemic verbs, with one handshape unit in the verb indicating the manner and another in the verb indicating path, clearly shows the choice of handshape cannot be separated from the conception of the location or motion event that is described. Engberg-Pedersen (1993) argued that, as a result, it does not seem to be the case that the movement represents the motion situation and the choice of handshape exclusively represents the characteristics of the referent. Thus, the notion that these handshape units are classifiers is problematic, because these units have both meaning of a verbal kind and special co-occurrence constraints with associated nominals (Engberg-Pedersen, 1993). Of course, the particular co-occurrence constraints do seem reminiscent of verbal classifiers in spoken languages, but the primary function of the handshape seems not to be one associated with classification, but representation.

Like the use of space and role shift (Liddell & Metzger, 1998), it has been argued that the handshape unit is a type of *referent projection*, contributing to "the apprehension of a linguistic object" (Engberg-Pedersen, 1993, p. 291; i.e., the handshape unit has a referent-tracking role) . Although classifiers serve pronominal and referent-tracking functions in spoken languages, the visual-gestural resources of signed languages allow for morphosyntactic uses of handshape units that are not possible in auditory-oral languages. Engberg-Pedersen (1993) pointed out that the handshape is visible and contributes to reference by being visible; the addressee can see what the handshape represents and thereby understand the reference. This is because there is a robust cognitive correspondence between the properties of these symbols and the properties of the referents they represent (a link between form and meaning referred to as *richly-grounded symbolism* by Macken, Perry & Haas, 1993, 1995). It seems quite clear that the handshape unit acts, in a sense, as a kind of surrogate or substitute for the referent. This makes possible the blends of mental spaces described elsewhere by Liddell (Liddell, chapt. 9, this volume; Liddell & Metzger, 1998). Just like a physically present referent, a signer may point towards an entity handshape held on the subordinate hand, or direct agreement verbs toward it (Liddell, 1994). The handshape can be manipulated in real space to represent the signer's conceptualization of the referent's path,

manner and direction of movement, its location and relative orientation, with the particular choice of handshape determined both by the salient inherent or perceived characteristics of the referent (such as its size and shape), and by the kind of static or dynamic situation the signer wants to describe. Because of the cognitive correspondence between visible aspects of the handshape units and properties of the referent, arbitrary links between their form and function appear to be relatively infrequent across different signed languages, as I show in the next section.

Classifiers or Richly-Grounded Symbols? An analysis of these handshape units that recognizes their richly grounded symbolism is important for understanding a number of aspects of their use and structure in signed languages.[19]

First, the use of PVs and the choice of handshape unit appear to be very similar in all documented signed languages (Cogill, 1999). The G (49H) and V (69L) handshapes used in descriptions of human motion in Auslan, for example, are found in many other historically unrelated signed languages, such as ASL (Supalla, 1986), Danish Sign Language (Engberg-Pedersen, 1993), and Thai Sign Language (Collins-Ahlgren, 1990).[20] The use of the B (3Qd) handshape for vehicle is also very widely attested (Brennan, 1992; Collins-Ahlgren, 1990; Corazza, 1990; Moody, 1983; Schembri, 1996; Wallin, 1996; Zwitserlood, 1996). Even isolated deaf children from hearing families who create home sign systems in the absence of any adult language models appear to use polycomponential verb forms that are remarkably similar to those in the signed languages of the major deaf communities (Singleton, Morford & Goldin-Meadow, 1993). These crosslinguistic similarities appear to be particularly true of verbs of handling and adjectival verbs. The use of handle and SASS handshapes appears, for all intents and purposes, to be identical in many of the signed languages so far described (Brennan, 1992; Collins-Ahlgren, 1990; Corazza, 1990; Moody, 1983; Schembri, 1996; Schick, 1990; Wallin, 1996; Zwitserlood, 1996). Admittedly, most of the world's signed languages remain undocumented, so claims of this kind may be premature (Newport & Supalla, 2000). Nevertheless, even those crosslinguistic similarities that currently exist in the sign linguistics literature are quite different from the idiosyncratic nature of classifier morphemes in spoken languages (particularly of the numeral classifier type), which may exhibit cross-linguistic variation, even among related languages and dialects (Grinevald, 2000).

Second, the close links between form and meaning may also account for the similarity between these verb forms and the communicative use of the hands by nonsigners (Cogill, 1999; McNeill, 1992). Research has indicated that hearing nonsigners, when asked to use gesture as their only means of communication in experimental studies, produce forms not unlike those described here (Schembri, 2001). There does appear to be one difference, however. Nonsigners sometimes use combinations of handshape and movement that tend to emphasize visual similarity to the referent, whereas combinations favored by signers appear to reflect the kinds of morphophonological constraints on such combinations found in signed languages (Singleton et al., 1993). We have already seen that the use of mimetic movement and of loci in space and on the body in PV signs has led to some dispute about the linguistic status of these units among sign linguists. Many (although perhaps not all) of these forms in signed languages, however, do appear to obey some of the same standards of well-formedness as lexical signs, choosing from a limited set of feature values, and thus they tend to appear somewhat more abstract and categorical than the forms produced by nonsigners. Kendon (1988) suggested that this is due to the fact that two processes are at work in signed languages, which he refers to as *image representation* and *sign formation* respectively. For Kendon (1988), image representation refers to "the cre-

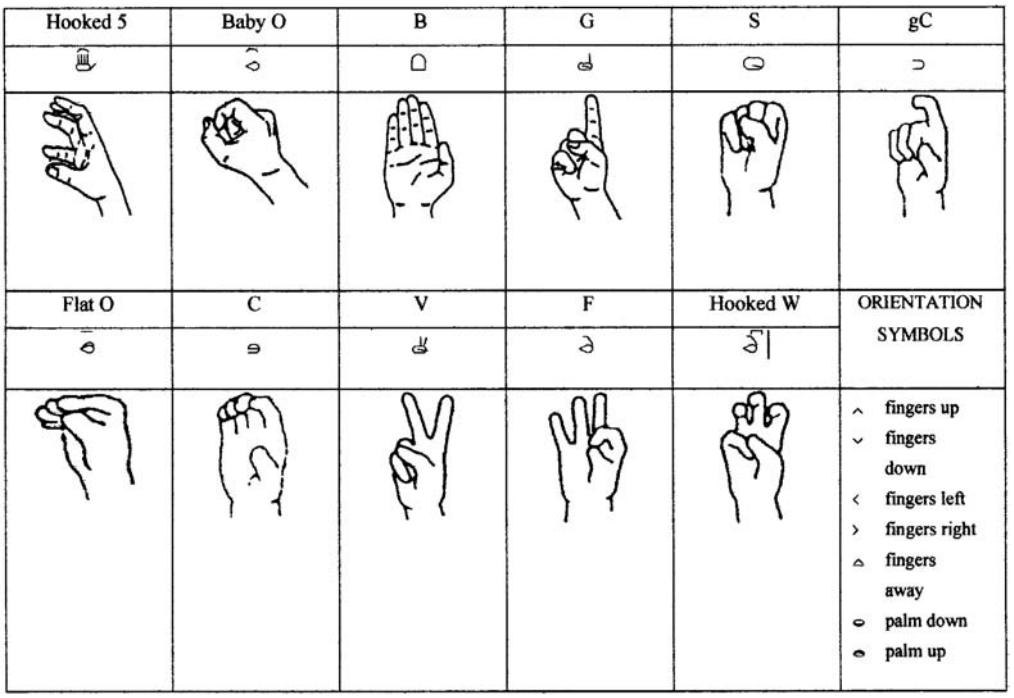

FIG. 1.10. Handshapes and orientation symbols.

ation of a gestural representation of some concrete image that has been selected as symbolic of the concept to be referred to." Sign formation, however, is

> the process by which such gestural representations then become transformed into expressions which are stable, shared by others, and which are structured in terms of both general formational constraints and the repertoire of contrastive locations, handshapes and movement patterns specific to the particular sign language. (pp. 162–163)

Moreover, the constraints of sign formation appear to not only influence the choice of available handshape units, but also the choice between using a PV or a lexical sign. Some of the earliest researchers recognized that handshape units appear to be substituted for lexical signs when the use of the lexical sign to describe the motion or location of a referent would result in combinations of hand configuration and movement that would "destroy the structure of the sign" (Kegl & Wilbur, 1976, p. 387).

Third, the importance of image representation also explains why creole signed languages, such as the recently emerged signed language in Nicaragua, make some use of PV forms similar to those described here (Senghas, 1994). Classifier morphemes, however, appear to be almost unattested in spoken language creoles, even when such languages develop in regions surrounded by classifier languages or from contact between languages that contain classifiers (Aikhenvald, 2000). Instead, classifiers in spoken languages appear to be secondary grammatical phenomena that have evolved, through processes of grammaticalization, from more primary lexical categories (most often nouns, but also verbs) (Grinevald, 2000). There is evidence which suggests that in some languages, noun and numeral classifiers have evolved from nouns (such as the evolution of the nouns for "tree," "leaf," and "fruit" into classifiers that categorize objects by

their shape, as either tree-like, i.e., long; leaf-like, i.e., flat; and fruit-like, i.e., round) and these classifiers may themselves eventually evolve into noun classes (Dixon, 1986), whereas verbal classifiers appear to evolve from noun incorporation or the reanalysis of serial verbs (Seiler, 1986). PV constructions appear, on the other hand, to have a much more central role in the origin and evolution of signed languages (Armstrong et al., 1995; Senghas, 1994; Singleton et al., 1993).

The picture that emerges then from this comparison of PVs in signed languages with classifier systems in spoken languages is that the handshape unit in these constructions has an origin, form, and function that appears to be distinct from what is found in classifiers. Although the selection of a particular handshape unit is partly motivated by the salient inherent or perceived characteristics of the referent, this does not appear to be the only factor involved in their use. Therefore, these forms cannot be said, strictly speaking, to have a primarily classificatory function.

CONCLUSION

As mentioned at the beginning of this chapter, I aimed to provide an overview of recent descriptions of classifier morphemes. The chapter cannot do justice, however, to the wealth of spoken language literature on this topic or to the abundance of new data coming from ongoing documentation of classifier systems. It has simply attempted to sketch some of the major issues in this area and their implications for our understanding of systems of nominal categorization in signed languages. We can conclude that, like noun classes or measure terms, the use of handshape units in PVs appear to represent a type of morphosyntactic subsystem that is motivated by similar semantic properties as the classifier morphemes found in some of the world's spoken languages. It also seems clear, however, that the handshape unit in these constructions exhibits a number of unique characteristics. Although I outlined the main reasons that the analysis of handshape units in PVs as classifiers is problematic, this topic is far from closed and requires much more investigation. More detailed data and more standard terminology is required in order to begin to address some of the issues raised here.

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I am grateful to Karen Emmorey, Elisabeth Engberg-Pedersen, Colette Grinevald, Trevor Johnston, Edward Klima, Scott Liddell, and Inge Zwitserlood for extremely helpful comments on earlier versions of this chapter. All errors that remain are my own.

ENDNOTES

[1]These include Adamarobe Sign Language (Frishberg, personal communication, 2000), American Sign Language (McDonald, 1982; Schick, 1990; Supalla, 1982), Balinese Sign Language (Branson & Miller, 1998), British Sign Language (Brennan, 1990, 1992; Deuchar, 1984; Sutton-Spence & Woll, 1999), Catalonian Sign Language (Fourestier, 1999), Chilean Sign Language (Adamo, Acuna, Cabrera & Lattapiat., 1999), Columbian Sign Language (Oviedo, 1999), Czech Sign Language (Turner, personal communication, 2000), Danish Sign Language (Engberg-Pedersen, 1993), Finnish Sign Language (Takkinen, 1996), Flemish Belgian Sign Language (Vermeerbergen, personal communication, 2000), French Sign Language (Moody, 1983), German Sign Language (Mathur & Rathmann, 1996), Hausa Sign Language (Schmaling, 2000), Hong Kong Sign Language (Tang, 2000), Indo-Pakistani Sign Language (Zeshan, 1999), Irish Sign Language (Matthews, 1996), Israeli Sign Language (Meir, 1996), Italian Sign Language (Corazza, 1990), Japanese Sign

Language (Fischer, personal communication, 2000), Jordanian Sign Language (Parvaz, personal communication, 2000), Kenyan Sign Language (Aarons, personal communication, 2000), Korean Sign Language (Hong, personal communication, 2000), Mexican Sign Language (Fridman-Mintz, 1998), Namibian Sign Language (Charon, personal communication, 2000); New Zealand Sign Language (Collins-Ahlgren, 1989), Nicaraguan Sign Language (Senghas, 1994), Quebec Sign Language (Miller, 2000), Russian Sign Language (Grenoble, 1992), Sign Language of the Netherlands (Zwitserlood, 1996), South African Sign Language (Aarons & Morgan, 1998), Swedish Sign Language (Wallin, 1996), Taiwanese Sign Language (Smith, 1990), and Thai Sign Language (Collins-Ahlgren, 1990).

[2]I use the general term *handshape* here, although I recognize that the forearm as well as the hand may play a role in these constructions, and that some handshape units also appear to have default orientation specifications. Note, too, that the use of the term *morpheme* to refer to the meaningful component expressed by the handshape is also somewhat problematic, as discussed beginning on page 17 *(Classifiers in Signed Languages?*). In this chapter, I choose to use the more general label, *handshape unit,* to draw attention to these issues.

[3]Colette Grinevald formerly published under the name of Colette Craig.

[4]As the use of the term *complex verb* suggests, I concentrate here on the verb role played by these constructions, but some of these forms may also act as nominals.

[5]The "r" here stands for *right*, a locus on the right of the signer, and "l" for *left*, a locus to the left of the signer (cf. Engberg-Pedersen, 1993). Other abbreviations used in this chapter include "c" (*center*), "f" (*forward*), and other loci such as "fl" (*forward-left*).

[6]Supalla (1982) suggested the term *body classifier* to refer to the uses of the signer's body in role shift. Most other researchers have not included this phenomenon as part of the classifier system, and thus I do not include it in Table 1.1.

[7]The assumption that late acquisition of VP forms results from their morphological complexity has recently been questioned by Cogill (1999). In addition, Slobin et al. (Chap. 13, this volume) showed that VPs do not always appear late in the development of ASL as a first language.

[8]The term *classifier* is in fact traditionally used in descriptions of Athabaskan languages to refer to four preverbal morphemes. These morphemes, however, do not appear to have a classificatory function. Recent work by Kibrik (1996) proposed that they are in fact transitivity indicators marking changes in the semantics of a verb that increase or decrease its transitivity.

[9]Note that, although she seemed to agree with distinctions between noun classes and classifiers, Aikhenvald (2000) nonetheless included both as examples of classifier systems. Her usage of the term *classifier* thus appears to be different from the definition used here.

[10]Grinevald (2000) suggested that these are both examples of class terms, despite their different orthographic status in English.

[11]Aikhenvald (2000) presented some arguments as to why classificatory verbs might still be considered examples of verbal classifiers, but there appears to be widespread agreement that these ought to be treated as a separate phenomenon (Barron, 1982, cited in Engberg-Pedersen, 1993;Croft, 1994; Grinevald, 2000).

[12]In later work, Supalla (1986) recognized that the Navajo classificatory verb system was no longer productive, and in this respect unlike what had been described for ASL.

[13]This also appears to be true of constructions involving classificatory verb stems in Navajo (McDonald, 1982).

[14] In some cases, however, the direction of the derivational relationship between polymorphemic predicates and monomorphemic lexical items is not clear. In my own data, when Auslan signers describe specific entities moving (such as a ruler or a toy duck), they sometimes use a handshape unit in the VP of motion that is identical or related to the handshape found in the equivalent lexical sign (i.e., the same as found in the sign RULER or DUCK) (Schembri, 2001). Native signers disagree about whether the source of the handshape unit is the handshape in the specific lexical sign, or vice versa.

[15]Evidence from recent neurological and psycholinguistic studies lends some support to this position (see, e.g., Corina, 1999; Emmorey & Herzig, this volume).

[16]Edward Klima (personal communication, April, 2000) pointed out that the nearest equivalent may be ideophones in spoken languages such as Yoruba, which appear to blend features of sound symbolism with phonological structure.

[17]In his more recent work, Supalla (1990) also makes a similar claim for ASL.

[18]Grinevald (personal communication, 2001) has suggested that this variability in classifier choice seems most true of numeral classifiers and may reflect other factors, such as the degree of grammatical meaning found in the classifier system.

[19]I do accept, however, that there is much about the use of these forms that cannot be explained by their iconicity (see Engberg-Pedersen, 1993).

[20]In both Danish Sign Language and Thai Sign Language, however, additional handshape units to describe human motion and location are also possible (Collins-Ahlgren, 1990; Engberg-Pedersen, 1993).

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2

Noun and Verbal Classifiers in Swedish Sign Language*

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Swedish Sign Language has a set of *noun classifiers*, that is, morphemes typically occurring after the noun in constructions like ONE MAN CL-PERSON ('a man') and MIRROR CL-SQUARE ('a mirror'; Bergman & Wallin, 2001). Swedish Sign Language also has a set of *classificatory bound (handshape) morphemes* used in polysynthetic constructions denoting motion and location (Wallin 1990, 1996), i.e., verbal classifiers in terms of Craig's classifier typology (Craig 1992). In the following, we argue that verbal classifiers in addition to being used in full predicates are used in formationally related constructions with a referring function, thereby sharing some characteristics with noun classifiers. As will be evident, observation of nonmanual features, such as gaze direction and mouth actions, is crucial to the analysis of constructions of both types.

NOUN CLASSIFIERS

In an earlier study, we showed that Swedish Sign Language has a set of noun classifiers, i.e., free morphemes typically occurring after a noun in constructions like ONE MAN CL-PERSON ('a man') and MIRROR CL-SQUARE ('a mirror') (Bergman & Wallin, 2001).[1] Noun classifiers are formationally related to nouns and/or to size-and-shape-specifying predicates, but clearly distinguished from them in meaning, distribution, and co-occurring nonmanual features. Compare examples (1) and (2):

(1) eyes: +C----------
hands: EXIST *MIRROR CL-SQUARE*
mouth: *spegel*----------

There was a mirror (in the bathroom).

* Note Transcription Conventions at end of chapter text before reading chapter.

(2)
```
head:      chin in--------- nod
eyebrows:  raised----------
eyes:      +C-------------- bl   hands
hands:     POSS-c    MIRROR      outline-SQUARE
mouth:     min       spegel      [protruding lips]

           My mirror is about this size.
```

In (1) and (2), MIRROR is followed by formationally related signs, CL-SQUARE (see Fig. 2.1) and outline-SQUARE (see Fig. 2.2). The movement is different in the signs in that in the predicate "outline-SQUARE," a square is outlined in the vertical plane, a form that may be described as having three segments/syllables, whereas CL-SQUARE has reduced movement, resulting in a monosegmental or monosyllabic form.

CL-SQUARE and outline-SQUARE also differ in co-occurring nonmanual features. Unlike nouns, noun classifiers do not have a borrowed lexicalized mouth movement, instead they take on the mouth movement from the preceeding noun. As can be seen from both the transcription and the illustrations, the mouth movement, transcribed with the Swedish word from which it originates (*spegel*), co-occurs with MIRROR in (2), but spreads to the classifier in (1). As a consequence, the mouth movement occurring with a classifier varies depending on the preceeding noun as shown by the following example (see Fig. 2.3):

FIG. 2.1. Illustration of CL-SQUARE in example (1) with mouth movement from preceeding noun (*spegel*, 'mirror').

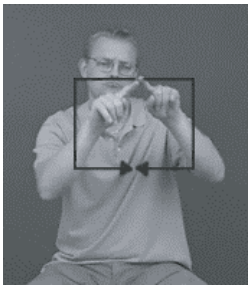

FIG. 2.2. Illustration of outline-SQUARE in example (2) with adverbial mouth movement (protruding lips).

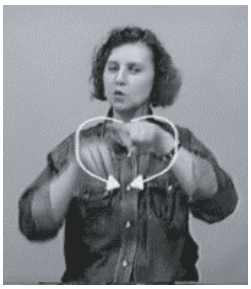

FIG. 2.3. Illustration of CL-SQUARE in example (3) with mouth movement from preceeding noun (*post*, 'mail').

(3)
```
eyes:  bl       +C----------------   bl bl +C-------- bl
hands: INDEX-c  GET MAIL CL-SQUARE  FROM  SPORT/CLUB
mouth:          få  post----------  från  sportklubb

I got mail from a sportsclub.
```

Example (2) also demonstrates how the predicate outline-SQUARE is clearly set off from the preceeding noun phrase by nonmanual features. The noun phrase POSS-c MIRROR has eye contact and a borrowed, lexicalized mouth movement, the predicate outline-SQUARE has no eye contact (the gaze is directed toward the hands) and the mouth articulates an oral adverb. Furthermore, because the noun phrase is marked as topic, the noun phrase and the predicate are separated with a blink and a nod.

Thus the nonmanual characteristics of a noun phrase including a noun classifier is that the eye contact lasts during the whole phrase and that the mouth movement is lengthened and spreads from the noun to the classifier. The following examples with other noun classifiers, glossed as CL-PERSON (see Fig.2.4), CL-PERIOD (see Fig.2 5), and CL-AREA (see Fig. 2.6), show similar nonmanual characteristics:

(4)
```
head:  bent left----------  turned right
eyes:  +C-----------------------------------------
hands: ONE MAN  CL-PERSON   SELF  SALESMAN  POINT-f
mouth:     man------------  själv försäljare-------

       There was (a man. He was) a salesman.
```

(5)
```
eyes:  -C      blink------ +C---------------------------
hands: PERFECT BE-THERE-lf COURSE ONE ONE-WEEK CL-PERIOD
mouth:                    kurs   en  vecka-------------

       I had been to a course for one week.
```

(6)
```
eyes:  +C----------------blink+C-------------------------
hands: POINT-c FORGET NEVER POINT-c BEFORE POINT-c-fl GERMANY
mouth:               aldrig       förut            tyskland

eyes:  ---------------
hands: HAMBURG CL-AREA
mouth: hamburg--------

       I'll never forget when I was in Germany, in Hamburg.
```

As already mentioned, noun classifiers are formationally related to nouns; in fact, the noun and the related noun classifier are manually identical, distinguished only in that the noun has a lexially determined mouth movement. Here is an example with the noun SQUARE ('picture') and its borrowed mouth movement:

(7)
```
head:     chin in-------- nod
eyebrows: raised---------
eyes:     +C------------- bl hands
hands:    POSS-c  SQUARE     outline-SQUARE
mouth:    min     tavla      [protruding lips]

          My picture is about this size.
```

FIG. 2.4. Illustration of CL-PERSON (hand moves down) in example (4) with mouth movement from preceeding noun (*man*, 'man').

FIG. 2.5. Illustration of CL-PERIOD (right hand moves in upward arc to the right) in example (5) with mouth movement from preceeding noun (*vecka*, 'week').

FIG. 2.6. Illustration of CL-AREA (hand moves in horizontal circle) in example (6) with mouth movement from preceeding noun (*Hamburg*, 'Hamburg').

The formational similarity between nouns and noun classifiers in Swedish Sign Language can be said to parallel Craig's (1992) observation that noun classifiers (in spoken languages) are "more often of nominal origin than the other types of classifiers …" p. 290). Also in terms of their semantic characteristics, noun classifiers in Swedish Sign Language resemble those of spoken languages in that they are "often the nominal superordinates of the nouns they classify, or identify some inherent feature of the noun, such as its essence or material" (Craig 1992, p. 290). CL-PERSON is used with nouns denoting human beings, such as MAN, WOMAN and professions as, e.g., in DOCTOR CL-PERSON and ONE MAN CL-PERSON. The classifier CL-PERIOD is used with expressions of time (ONE ONE-WEEK CL-PERIOD, AUTUMN CL-PERIOD) and CL-AREA in phrases referring to places (HAMBURG CL-AREA, CENTER CL-AREA). The classifier CL-SQUARE is used with nouns like MIRROR, GLASS, MAIL, CERTIFICATE, PAPER and TELEVISION, denoting objects with a flat, visually salient surface.

As for their distribution, noun classifiers typically follow the noun. A noun classifier may be followed by a determiner, in which case the mouth movement of the noun spreads to the determiner. Noun classifiers cannot co-occur with possessive pronouns, nor with their respective related noun, making constructions like POSS-c DOCTOR CL-PERSON and AREA CL-AREA unacceptable.

In contrast to numeral classifiers and genitive classifiers, the use of noun classifiers "does not depend on the presence of another element of the noun phrase" (Craig 1992, pp.283–284). One

characteristic of their use in Swedish Sign Language is that they are only used in referring noun phrases with specific reference, i.e., a noun phrase used predicatively cannot contain a noun classifier (*POSS-c WIFE *INTERPRETER CL-PERSON*), nor can a phrase with generic reference (*BEFORE *HEARING CL-PERSON-PLURAL* KNOW-NOT SIGN/LANGUAGE).

The function of noun classifiers in narrative discourse is to introduce prominent discourse participants, in particular the classifier CL-PERSON used for human referents. Also, in this respect, noun classifiers in Swedish Sign Language resemble noun classifiers in spoken languages. Hopper (1986) observed that in a written Malay narrative the "classifiers give nouns a prominence in the discourse" (Hopper 1986, p. 323) and that "a classifier can be seen to 'foreground' (in some imprecise sense) physical objects and indicate that they are PART OF the discourse rather than incidental props" (Hopper 1986, p. 313). According to Hopper, a classifier is likely to be used with specific reference, in presentative constructions, and for "persistent" discourse referents, i.e., referents that will be mentioned again, features that also characterise the use of noun classifiers in Swedish Sign Language (see Bergman & Wallin, 2001 for an analysis of the use of CL-PERSON in a Swedish Sign Language narrative).

In summary, noun classifiers in Swedish Sign Language are free morphemes, used in noun phrases with specific reference for introducing prominent discourse referents in narrative discourse. They are formationally related to nouns and size-and-shape-specifying predicates, but clearly distinguished from them in meaning, distribution, and nonmanual features.

CONSTRUCTIONS WITH CLASSIFICATORY HANDSHAPES

In addition to noun classifiers, Swedish Sign Language has a set of classificatory bound (handshape) morphemes used in polymorphemic predicates, i.e., verbal classifiers in terms of Craig's (1992) classifier typology. Wallin (1996) referred to the constructions as polysynthetic signs denoting motion and location. Example (8) contains the predicate LIQUID-MOVE-DOWN-on-head (the spread hand moves down in contact with the back of the head; see Fig. 2.7). The noun phrase BLOOD and the predicate are clearly set off from each other by nonmanual signals, such as different gaze direction and mouth movements:

(8) head: turned left----------
eyes: +C closed----------
hands: BLOOD *LIQUID-MOVE-DOWN*-on-head
mouth: blod *[protruding tongue]*

Blood was pouring down the back of my head.

FIG. 2.7. Ilustration of LIQUID-MOVE-DOWN (hand moves down in contact with back of head) in example (8) with adverbial mouth movement (protruding tongue).

FIG. 2.8. Illustration of LIQUID-MOVE-DOWN-on-head (hand moves down) in example (9) with mouth movement from preceeding noun (*fukt*, 'moisture').

However, data from narrative discourse in Swedish Sign Language show that constructions with a classificatory handshape may share nonmanual features with the preceeding noun as in example (9) (see Fig. 2.8):

(9) eyes: +C hand bl
hands: *MOISTURE LIQUID-MOVE-DOWN*
mouth: *fukt*----------

It (the window) was damp.

In (9), the mouth movement (*fukt*) spreads from the noun to LIQUID-MOVE-DOWN and is not as clearly set off as the predicate in example (8). Originally, we attempted to describe constructions like (9) as a second type of noun classifier, postulating another set of noun classifiers related to predicates of motion and location in addition to the noun classifiers related to size-and-shape-specifying predicates. We returned to the narratives that were the main material for the study of noun classifiers, and found a few examples:

(10) eyes: +C--------- bl +C---------- -C
hands: POSS-c HUSBAND EXIST WOOD WOODWORK MUCH LOCATED-IN-f Ø
mouth: min man ha trä slöjd mycket i som

eyes: +C---------- blink
hands: *DUST MANY-HORIZONTAL-EXTENSION*
mouth: *damm*----------

My husband has a workshop. There is a lot of dust there.

(11) eyes: +C----------
hands: MANY *PEOPLE MANY-ENTITIES-IN-MOTION*
mouth: många *folk*----------

There were many people there (at the party).

The forms glossed as MANY-HORIZONTAL-EXTENSION (see Fig. 2.9) and MANY-ENTITIES-IN-MOTION (see Fig. 2.10) are formationally related in that they both use two spread hands that are directed forward with palms down. In MANY-HORIZONTAL-EXENSION, the hands make a diverging horizontal movement; in MANY-ENTITIES-IN-MOTION, the hands circle alternatingly with wiggling fingers. The constructions have similar nonmanual characteristics; they share mouth movements with their respective nouns and the signer has eye contact

FIG. 2.9. Illustration of MANY-HORIZONTAL-EXTENSION (flat hands diverge) in example (10) with mouth movement from preceeding noun (*damm*, 'dust').

FIG. 2.10. Illustration of MANY-ENTITIES-IN-MOTION (hands circle horizontally with wiggling fingers) in example (11) with mouth movement from preceeding noun (*folk*, 'people').

with the receiver, i.e., the same nonmanual features as were just described for noun phrases containing a noun classifier. Moreover, with respect to their function, MANY-HORIZONTAL-EXTENSION and MANY-ENTITIES-IN-MOTION also resemble that of noun classifiers in that they are used in phrases with specific reference to introducing important discourse referents.

However, constructions of this clearcut type are not as frequent as those with noun classifiers, and we have but a few examples. What we did find, however, was a continuum of forms of the type represented in examples (10) and (11) at one end and verbal predicates of location and motion using classificatory handshapes at the other. We have found the following characteristics of the two types of forms using classificatory handshapes:

(a) Verbal predicates of location and motion using classificatory handshapes:

-spatially and temporally "heavier" forms
-predicate position (may, but does not have to be preceeded by a noun)
-nonmanual features:
  eye gaze toward the hands
  oral/facial adverb
-morphologically complex
-predicating function

(b) "Modifying forms" using classifictory handshapes

-spatially and temporally reduced form
-adjacent to noun (typically postpositioned)
-nonmanual features copied from preceeding noun:
  eye contact with receiver
  mouth movement of the noun spreading to the modifier

-morphologically simplex
-used in referring noun phrases with specific reference
-used in presentative constructions, i.e. when introducing new referents, e.g. in constructions with EXIST ('to be', 'to have')
-referring, identifying function

The following example illustrates the use of both types of forms:

(12)
```
eyes:  f------- +C------------- bl +C------------ bl ----
hands: BE+INDEX SAW MAN BE-LOCATED-SITTING-fr SUN GLASSES
mouth:          såg man---------------------- sol glas

eyes:  +C---------  +C-------at hand +C--
hands: ACROSS-EYES  BE-LOCATED-SITTING-fr
mouth: [lower lip raised and protruding]

There was a man with sun glasses sitting there.
```

MAN is followed by a construction (with the bent V-hand) with many of the characteristics of the "modifying" type, including being adjacent to a noun in a noun phrase with specific reference, sharing the same mouth movement as the preceeding noun, and eye contact. Like phrases with noun classifiers, the phrase MAN BE-LOCATED-SITTING-fr introduces a prominent discourse participant. The second occurrence of the gloss BE-LOCATED-SITTING-fr actually represents a slightly different form (see Fig. 2.11), in that the hand is held still longer. The nonmanual features are those that characterise predicates: an oral adverb and a (quick) glance in the direction of the hand. Its position in the utterance as well as its meaning rather indicate that it is a predicate.

Example (13) contains another pair of similarly related constructions:

(13)
```
eyes: +C------------- down  +C------------------------
hands: LOCATED-IN ONE RAT   CROUCHED MOUSTACHE BOW-TIE
left:                       CROUCHED
mouth:             en  rått a [neutral-----------------]

eyes:    closed--- left hand
hands:  CROUCHED-----------
left:   CROUCHED   APPROACH-fl …
mouth:  [protruding lips]

A rat wearing moustache and bow-tie was sitting in there. He
saw someone approaching …
```

FIG. 2.11. Illustration of BE-LOCATED-SITTING-fr (short downward movement) in example (12) with lower lip raised and protruding.

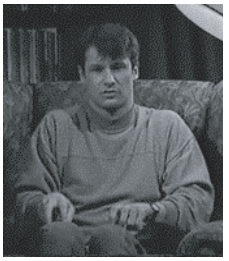

FIG. 2.12. Illustration of the first occurrence of CROUCHED (hands in short contact with knees) in example (13) with neutral mouth.

FIG. 2.13. Illustration of the second occurrence of CROUCHED (hands rest in contact on knees) in example (13) with protruding lips.

In (13), a new referent is introduced with a presentative construction in which the predicate LOCATED-IN-f preceeds the subject (ONE RAT…), an otherwise not acceptable order (cf. the English "Here comes the king"). After ONE RAT, the signer uses a very short, two-handed form, CROUCHED (bent V-hand on knee), with eye contact and a neutral mouth position (see Fig. 2.12). The phonological "lightness" of this occurence of CROUCHED can be described in terms of duration: the phase in which the hands are in contact with the knees is .28 sec. In the related form (following BOW-TIE), which has closed eyes and an oral adverb (see Fig. 2.13), the duration of the contact phase is .68 sec.

It is not clear to us at this moment what the syntactic structure of (SAW) MAN BE-LOCATED-SITTING-fr in (11) and ONE RAT CROUCHED in (12) is, i.e., whether they are best described as nominals with postpositioned modifiers or sentences with (heavily reduced) predicates. What is clear though, is that both constructions are more like noun phrases with noun classifiers in terms of nonmanual features and function than predicates. A similar example can be seen in the following example (see Fig. 2.14):

(14)
```
eyes:   (forward -C )  +C---- -C +C--------
hands: (ALL     CAR ) TWO CAR   TWO-DIM-BE-LOCATED
left:                         TWO-DIM-BE-LOCATED
mouth: (alla )        två bilar-------- [neutral]

(false start?)        We had two cars.
```

Again, the nonmanual features resemble those of phrases with a noun classifier: there is eye contact and the mouth movement of the preceeding noun spreads (and then assumes a neutral form). It is also the first mention of the cars. In spite of the spatial arrangement of the hands, the utterance does not mean 'two cars were standing there (one behind the other)'. It merely asserts the existence of two cars.

Examples (10) to (14) serve to demonstrate the use of forms related to polymorphemic predicates denoting location and motion and we suggest that they function more like modifiers than

FIG. 2.14. Illustration of TWO-DIM-BE-LOCATED (short downward movement) in example (14) with mouth movement from preceeding noun (*bil*, 'car').

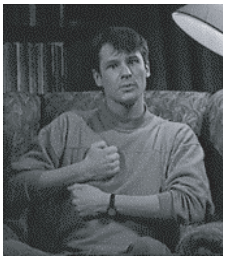

FIG. 2.15 Illustration of the noun SOLDIER (hands establish contact with chest twice) in example (15) with borrowed mouth movement (*soldat*, 'soldier').

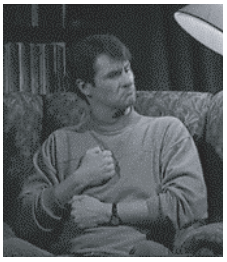

FIG. 2.16. Illustration of RIFLE-HOLDER (hands move inward and establish contact with chest) in example (17) with corners of the lips down.

predicates. In the following we take a closer look at three sets of forms from one narrative (a translation of H.C. Andersen's story, *The Steadfast Tin Soldier*). We argue that polymorphemic forms with classificatory handshapes are typically used for predication, but that related, reduced forms are used in referring expressions serving to identify referents, rather than making predications about them.

The first set of forms is a) the noun SOLDIER (Fig. 2.15) and two different constructions also using the clenched hands (verbal classifier for handling of thick one-dimensional (part of) object) glossed as (b) HOLD-RIFLE and (c) RIFLE-HOLDER (Fig. 2.16) respectively.

The context of example (15) is that a boy has been given a box with tin soldiers.

(15)
eyes:	down------	+C---------	at hands
hands:	TAKE-SMALL	*TIN SOLDIER*	INDEX-left-hand
left:			HOLD-SMALL
mouth:		*tennsoldat*	

He took out a tin soldier.

The signer uses the noun SOLDIER (Fig. 2.15) in which the clenched hands establish contact with the chest twice. SOLDIER has simultaneous eye contact and a borrowed mouth movement. In the following sequence, the soldier's outfit is described:

(16)
```
eyes:  at hands---- bl +C-------------------- hands +C--
Hands: GET-TO-ONE'S-FEET HOLD-RIFLE   PAINT RED COAT   BLUE
mouth: stå             [tense lips] måla  röd        blå

eyes:  bh     +C--- r.hand +C------  r bl +C---------------
hands: PUT-ON WHITE BELT   EXIST GUN HOLD-RIFLE BLACK SHAPE-
mouth:        vit           ha    pistol        svart

eyes:  up-------  bl  +C-------
hands: TALL-HELMET   HOLD-RIFLE
mouth:

Standing straight, holding a rifle and painted with a red
coat, blue trousers, a white belt, holding a rifle and
wearing a black helmet.
```

The form glossed as HOLD-RIFLE differs from that of SOLDIER in that it has only one movement toward the chest and that the duration of the contact is longer. HOLD-RIFLE is used both in the first description of the soldier(s), after the presentative construction EXIST GUN and repeated at the end of example (16).

Later in the narrative, we are being told that the boy finds one more soldier hidden in a corner of the box. This soldier, who has only one leg, is the main character of the story. By far the most frequent way of referring to him in the remaining part of the story is with the form glossed as RIFLE-HOLDER. In RIFLE-HOLDER (Fig.2.16), which is the most reduced form in this set, there is no movement toward the chest before the contact (except for a transitional movement). Fig. 2.16 also shows a facial expression that often, but not always, is used with RIFLE-HOLDER.

(17)
```
head:                        nod        left CATCH-SIGHT-OF
brows: up---------------------
face:          raised cheeks----
eyes:  right   +C--------------- bl +C-- bl    left-------
hands: INDEX-r STAND-ON-ONE-LEG   RIFLE-HOLDER------------
left:                             RIFLE-HOLDER------------
mouth: den                        [lip corners down------]

head: (chin in)
brows:
face:
eyes:  left-------------- +C------
hands: CATCH-SIGHT-OF-left INDEX-1
left:  --------------------------
mouth:

The soldier with with one leg suddenly caught sight of them.
```

In example (17), the two-handed form RIFLE-HOLDER is first signed with (brief) eye contact, as is typical of referring noun phrases. The gaze direction is then changed from eye contact to left and the chin makes a quick inward movement, but the hands still remain in the position of RIFLE-HOLDER. Note that the movement of the chin is transcribed with capitals, CATCH-SIGHT-OF, on the line of the head. This is to indicate that the movement conveys the meaning 'catch sight of' (or 'discover'), i.e., we describe it as a nonmanually expressed predicate. The narrator then expresses the same meaning with a manual lexical item (CATCH-SIGHT-OF-left) signed with the right hand while the left hand remains in the position of RIFLE-HOLDER (Fig. 2.17).

FIG. 2.17. Illustration of CATCH-SIGHT-OF (right hand) and RIFLE-HOLDER (left hand) in example (17) with corners of the lips down. (Right hand moves left while changing to clenched hand; left hand in contact with chest).

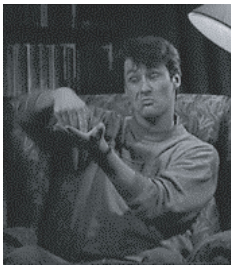

FIG. 2.18. Illustration of STAND-ON-ONE-LEG (right hand moves down and establishes contact with palm of left hand) in example (18) with corners of the lips down.

It is obvious from the frequent use of the form glossed as RIFLE-HOLDER in the text that its function is primarily to identify the referent. Similar observations have been reported by Ahlgren & Bergman (1994):

> A referential cue to the acting participant can sometimes be a classificatory handshape in the nondominant hand accompanying the verb expressed with the other. If the action reported is expressed only nonmanually, like nodding or mouth movements, then the dominant hand (or both hands) might be used with this weak referential function… (p. 35)

Example (18) shows the first occurrence of one of the forms in the second set of forms we discuss: STAND-ON-ONE-LEG (index finger in palm; Fig. 2.18), here with a predicating function:

(18)
```
eyes:  +C--------------------  down--------------
hands: AT-LAST CATCH-SIGHT-OF CORNER
left:                                 TAKE-SMALL
mouth: sist                    hörn

eyes:  hands  +C----------------------
hands:   INDEX-left-hand HAVE ONE LEG
left:    V-hand----------------------
mouth:                    ha   ett ben

eyes:  at hands------- +C----------------------  -C +C—--
hands: INDEX-left-index CAUSE BE-ENOUGH NOT MORE BUT CAN
left:  ---> middle finger
mouth:                  orsak  räcker   inte mer men kan

eyes:  at hands--------  +C--
hands: STAND-ON-ONE-LEG   YET
left:
mouth: [lip corners down] ändå

At last he caught sight of something in a corner (of the box).
He took it up. It was a soldier with only one leg—there was't
enough of tin—and yet, he was able to stand up.
```

STAND-ON-ONE-LEG is later used to reintroduce the soldier (in [17] repeated below):

(17') head: nod
brows: up----------
face: raised cheeks----
eyes: right +C---------- bl +C-- bl LOOK-left-----
hands: INDEX-r *STAND-ON-ONE-LEG* RIFLE-HOLDER----------
left: RIFLE-HOLDER----------
mouth: den [lip corners down---]

head:
brows:
face:
eyes: left---------- +C------
hands: CATCH-SIGHT-OF-left INDEX-1
left: ----------
mouth:

The one standing on one leg suddenly caught sight of them.

In this case STAND-ON-ONE-LEG is used in a referential phrase, INDEX-r STAND-ON-ONE-LEG, the structure of which suggests that it is a relative clause (nonmanual signals, including the stretched mouth). If so, STAND-ON-ONE-LEG would be described as a predicate, an analysis that is supported by its relatively long duration, .68 sec. However, the overall function of INDEX-r STAND-ON-ONE-LEG is that of identifying a specific referent. This is also true for the use of STAND-ON-ONE-LEG in the example below (see Fig. 2.19):

(19) eyes: +C---------- -C---
hands: BUT ONE BE-LOST ONE *STAND-ON-ONE-LEG* WHERE
mouth: men en en *[neutral]* var

But one was missing. Where was the one with only one leg?

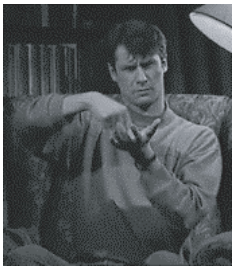

FIG. 2.19. Illustration of STAND-ON-ONE-LEG (short downward movement to contact with palm of left hand) in example (19) with neutral mouth.

FIG. 2.20. Illustration of STUCK-BETWEEN-STONES (extended index and middle fingers in contact with flat hand) in example (20) with adverbial mouth movement (stretched lips).

In example (19), STAND-ON-ONE-LEG lacks the characteristics of the prototypical predicating expression. It has moved along the continuum to the other extreme and is now used in a referring expression. The duration of STAND-ON-ONE-LEG in (19) is .16 sec., i.e., approximately ¼ of the more predicatelike form in example (18) shown in Fig. 2.18.

The third set of forms includes a predicate glossed as STUCK-BETWEEN-STONES (see Fig. 2.20) and formationally related, reduced forms (also glossed as STUCK-BETWEEN-STONES). The classificatory handshapes in these constructions are the flat hand and the V-hand (extended index and middle fingers), used for two-dimensional entities and human beings respectively.

(20)

(a) eyes: +C---- hands------------------- +C--------------
Hands: THINK LAND-HARD-ON-PAVING-STONE BUT NOT uh STONE
Mouth: tro men inte sten

Eyes: hands blink
Hands: CLOSELY
mouth:

(b) eyes: +C hands------------------ +C-----------------
Hands: FALL-BETWEEN-STONES *STUCK-BETWEEN-STONES* FIXED
Mouth: *[airstream]* fast

(c) eyes: ?C----------------- up-------- +C------------------
hands: *STUCK-BETWEEN-STONES* RIFLE-HOLDER *STUCK-BETWEEN-STONES*
mouth: *[stretched lips]* *[neutral]*

He thought that he would land hard on the stones, but he fell between two stones and got stuck there.

In the sequence transcribed above STUCK-BETWEEN-STONES in (20b) and the first occurrence in (20c) are verbal predicates. In the beginning of (21) below, a reduced form (see Fig. 2.21) follows the noun SOLDIER (21a). The same form occurs after STEP-ON (in 21b) and is then the only expression for the (syntactic) object of STEP-ON:

(21)

(a) eyes: +C -C left +C hands +C---------- left
Hands: OUT SEARCH *SOLDIER* *STUCK-BETWEEN-STONES* SEARCH
Mouth: ut *soldat* *[neutral]*

(b) eyes: +C-------------------- at hands +C---------
Hands: BUT SAW NOT BUT ALMOST STEP-ON *STUCK-BETWEEN-STONES*
Mouth: men såg inte men nära *[neutral]*

(c) eyes: +C----------------- at hands------------ +C----
Hands: ALMOST STONE STREET STUCK-BETWEEN-STONES ALMOST
Mouth: nära sten gata [neutral] nära

They went out looking for the soldier, but did not see him, they almost stepped on the stone where he was stuck.

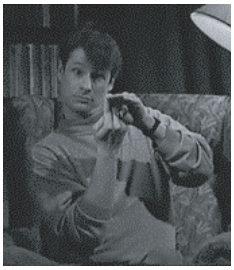

FIG. 2.21. Illustration of STUCK-BETWEEN-STONES (extended index and middle fingers in contact with flat hand) in example (21a) with neutral mouth.

FIG. 2.22. Illustration of STUCK-BETWEEN-STONES (extended index and middle fingers in contact with flat hand) in example (22) with borrowed mouth movement (*va*, 'what') expressing disappointment.

In example (22) below, STUCK-BETWEEN-STONES also seems to modify the noun.

(22) eyes: +C up------------ bl bl +C---
Hands: SOLDIER *STUCK-BETWEEN-STONES*--
Mouth: soldat *va*--------

The soldier was disappointed.

Moreover, the hands remain in the position of STUCK-BETWEEN-STONES when the nonmanual *va* ('what!?') is articulated (see Fig. 2.22), reminiscent of (17) in which RIFLE-HOLDER occurs together with the nonmanually expressed CATCH-SIGHT-OF.

CONCLUDING REMARKS

We showed that constructions with classificatory handshapes denoting location and motion are typically used for predication, and that related, reduced forms are used in referring expressions serving to identify referents rather than making predications about them. We also demonstrated that such constructions share nonmanual features, such as gaze direction and mouth movement, with noun phrases containing noun classifiers.

Phrases with noun classifiers are used for introducing prominent discourse referents, but rarely for the reintroduction of referents (Bergman & Wallin, 2001). In contrast, constructions with classificatory handshapes are frequently used when referents are reintroduced and for maintaining reference. In fact, we even observed a tendency for the narrator to use the different forms referring to the tin soldier to represent different points of view: RIFLE-HOLDER in sequences told from the soldier's point of view and STAND-ON-ONE-LEG from the point of view of the narrator and the boy (but not of the soldier), whereas STUCK-BETWEEN-STONES does not seem to be restricted in terms of perspective.

This chapter has focused on the function of constructions with classificatory handshapes in Swedish Sign Language. Among the many questions arising from the data discussed here are whether the phenomena reported on are typical of narrative discourse only, or shared by other types of monologue discourse and dialogue. Likewise, the issue of how the relationship between the different forms with classificatory handshapes should be accounted for has not been addressed. Is it, e.g., a "morphological derivational process … or is the reduced form simply a by-product of the fact that the form is in a nonhead position (and therefore maybe destressed) in the phrase ?" (Irit Meir, personal communication). The former suggestion seems to us the most plausible, because constructions with classificatory handshapes may be the only expression for the referent in referring expressions as demonstrated by the use of STUCK-BETWEEN-STONES in example (21b). However, whether the process is "some kind of 'nominalization,' or the derivation of deverbal adjectives" (Irit Meir, personal communication) still remains an open question.

TRANSCRIPTION CONVENTIONS

MIRROR, BE-THERE	(English) words in capitals represent manual signs in Swedish Sign Language
CL-	A gloss with initial CL- represents a noun classifier

Small letters after glosses indicate directions relative to the signer:

-c	toward, near or in contact with the signer's body
-l, -r	left, right
f (-fl, -fr)	In front of the signer (slightly to the left/right)
+C	Eye contact with the receiver
bl	blink
Spegel ('mirror')	Swedish words represent mouth movements borrowed from Swedish

ENDNOTES

[1]Because, to the best of our knowledge, Swedish Sign Language is the only sign language for which noun classifiers have been reported so far, we repeat some examples and some of the arguments for their existence in the following. The reader is referred to Bergman & Wallin (2001) for a more detailed account.

ACKNOWLEDGMENTS

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3

Classifier Constructions and Morphology in Two Sign Languages

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> We see then, in Sign, at every level—lexical, grammatical, syntactic—a linguistic use of space: a use that is amazingly complex, for much of what occurs linearly, sequentially, temporally in speech, becomes simultaneous, concurrent, multileveled in Sign. The surface of Sign may appear simple to the eye, like that of gesture or mime, but one soon finds that this is an illusion, and what looks so simple is extraordinarily complex and consists of innumerable spatial patterns nested, three-dimensionally, in each other.
>
> —Oliver Sacks 1989 (p. 87)

CREOLES AND THE MORPHOLOGY OF SIGN LANGUAGES

For several years, we have been studying sign language morphology from the perspective of an observation that has surfaced with regularity over the short history of sign language linguistics: that sign languages are like creoles, in both their genesis and their structure (Bickerton 1977; Fischer 1978; Feldman, Goldin-Meadow, & Gleitman, 1978; Gee & Goodhart 1985, 1988). The

influence of this idea has only grown over time, so that very recently, the development of Nicaraguan sign language morphology, which has been documented in some detail since its inception in a school in Managua in the late 1970s (Kegl, Senghas, & Coppola , 1999; Senghas, 1995), has been taken as a paradigm example of creole genesis, of value not only to sign language researchers, but also to creolists and those interested in language acquisition, language change, and basic linguistic theory. It is not hard to understand why so many researchers have so quickly come to feel a similarity between sign languages and creoles: both types arise under conditions in which the primary linguistic data that serve as the basis for a child's native language come from nonnative speakers. In the case of creoles, the standard definition is that the language that children are exposed to, on the basis of which they must formulate the creole, is a pidgin, no one's native language. In the case of sign languages, only a small fraction of signers (around 8.5%) are raised in households with even a single signing parent or sibling and are thus able to acquire a sign language as their true native language (Gallaudet Research Institute, 2000). Even in this situation, the parent is almost never a native signer, so that, just as with creoles, the child acquires the sign language on the basis of data supplied from a nonnative user. Even in the United States, which has a large community of signers of a single language, American Sign Language, a vanishingly small fraction of native signers are born into households where even one parent is a native user of the language. Thus, almost no signers acquire their language on the basis of native-user input. Most signers in developed countries acquire their sign language at school, usually past the very early childhood years when language acquisition is at its best, and the structure of the signing community guarantees that this will remain true. In recent years, however, there have been programs to promote use of sign language by hearing parents, including parent–infant programs where parents can learn sign language while their children are still young. Despite these recent initatives, for the most part, sign languages, unlike creoles, will always have a large proportion of nonnative users. We will give examples later of how the need to maintain communication across a broad spectrum of levels of competence affects sign languages.

Spoken creoles and sign languages share other features. All known creoles and sign languages are young, having all been created in the last 200 years or so. Because they are young, we do not expect them to have accrued all the quirks that affect older languages, and so they may be closer to language in its unmarked state. And indeed, all creoles and all sign languages have little sequential affixation of any kind, derivational or inflectional (McWhorter 1998). Of course, the fact that a language lacks sequential affixation does not in itself mean that the language is new or a creole. After all, Vietnamese has no affixation at all (Thompson 1965) and the Chinese languages are quite impoverished affixationally, with Mandarin having only about twenty affixes at most.[2] But regardless of why these other languages have little morphology, it is reasonable to ascribe the dearth of sequential affixation in both creoles and sign languages to their youth. Despite these similarities, however, unlike creoles, all sign languages that have been investigated in any detail so far have complex morphology. The morphology of sign languages tends to be nonconcatenative or "simultaneous" rather than sequential. An example is verb agreement, which we describe below. This is trebly peculiar. As young languages, sign languages should have little morphology of any kind, let alone inflectional agreement. In addition, nonconcatenative or simultaneous morphology is much less common in spoken languages than is sequential affixation: although most spoken languages have sequential affixation but no simultaneous morphology, no spoken language we know of has simultaneous morphology but no sequential affixation. We have argued elsewhere (Aronoff, Meir, & Sandler, 2000) that the complex pattern of simultaneous agreement morphology

found in sign languages, and so remarkably similar across them, is rooted in the medium of these languages: sign languages show agreement because they can do so directly and iconically. Spoken languages can only show agreement if they have had the chance to develop both noun classes and the necessary morphological markers. And indeed, although it is a hallmark of the Indo-European family with which we are most familiar, agreement morphology is not widespread among the spoken language families of the world.

Besides agreement, two other types of morphological processes are pervasive among sign languages: verbal aspect and the use of classifiers, which is the theme of this volume and hence the subject of our chapter. We follow here the general methodology of our research project, which is to compare directly two sign languages, American Sign Language (ASL), and Israeli Sign Language (ISL). Because it is by far the less studied of the two, most of the descriptive detail of our work is devoted to ISL.

One major theme of our research has been the extent to which the structure of sign languages is grounded in the medium of their transmission. In particular, we find that the visual nature of sign languages makes it relatively easier for them to encode spatial and temporal information than for spoken languages. By comparing two unrelated sign languages, we are able to make more firmly supported claims about which aspects of sign languages are grounded in the medium and which are properties of each individual language.

Another major goal of our research, which is highlighted in this chapter, is to see to what extent we can find differences between relatively older and younger sign languages. ASL is among the oldest sign languages known. It can be traced directly to the founding of the first American School for the Deaf in 1817. The roots of ISL are somewhat less clear, though clearly it is much younger than ASL. The deaf community in Israel started to form in the late 1930s and early 1940s. In the early stages, ISL was probably influenced by immigrants and teachers from Germany; and in the late 1940s and the 10 years that followed, by immigrants from North Africa (Meir & Sandler, in press). On the assumption that languages become more conventional with history, one would predict that ASL should show more conventionalization than ISL. We show that this is indeed true, at least within the restricted area of classifiers. We also show, though, that even ASL, despite its greater conventionalization, retains depictive and iconically grounded signs and grammatical structures of the sort that we find in ISL.

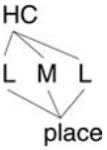
We also compare our findings on ISL and ASL to those of Kegl et al. (1999) on Nicaraguan Sign Language. These authors use the difference between two cohorts of signers, who may be characterized as users of a pidgin and its consequent creole, to argue for a "catastrophic" view of creole genesis. We show that some of the same sorts of differences that they observed hold between ISL and ASL. Because both ISL and ASL are full-fledged sign languages with native users, it follows that the differences between these two, at least, cannot be ascribed to catastrophic metamorphosis, weaking the generality of Kegl et al.'s (1999) claim.

We begin this chapter with an overview of the morphophonology of sign languages, demonstrating what is meant by simultaneous and sequential in these languages. We then turn briefly to typical examples of each—verb agreement versus some sequential affixes—to establish our frame of reference. Focusing on classifiers, we compare the systems in ASL and ISL, suggesting that certain differences between the two languages may be due to the differences in their ages. Another well-known diachronic phenomenon, the "freezing" of classifier constructions as unanalyzed lexical items, is also described in some detail. This approach, which examines synchronic phenomena from a diachronic perspective, informs our position on the creole issue.

SIMULTANEITY AND SEQUENTIALITY IN SIGN LANGUAGE MORPHOPHONOLOGY

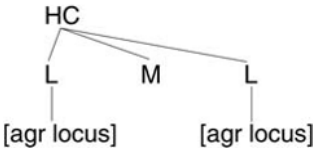
It is generally acknowledged that sign language morphology has a simultaneous quality. Inflectional and derivational functions are often described as layered upon or nested in basic forms of signs (e.g., Bellugi & Fischer, 1972; Klima & Bellugi, 1979). More recently, it has been demonstrated that a purely simultaneous description is flawed, and that there is a certain amount of sequentiality to most signs (e.g., Liddell, 1984; Liddell & Johnson, 1989). These two points of view are integrated in a model that focuses on morphological processes and compares sign language morphology to the "nonconcatenative" morphology found in Semitic languages (Sandler, 1989). The sign canonically assumes a prosodic LML template: a location, a movement, and another location.[3] A single basic hand configuration (HC) and a single major place of articulation normally characterize the whole sign, lending it its simultaneous appearance.

(1) Canonical sign form



Many of the morphological processes that are most typical of sign languages respect this same LML template, simply altering the specifications of the location segment(s) or of the movement segment (Sandler, 1990, 1993, 1999a). Verb agreement, shown schematically in (2) and described in more detail in the next section, inserts particular agreement specifications into the location segments. Temporal aspect morphology, exemplified in (3), typically adds duration to locations or movements, or changes their features, e.g., changing a straight movement to an arc, and sometimes includes reduplication.[4] Examples from ASL are shown schematically below. In (3b), x and y stand for the feature complexes specified for each location.

(2) Verb agreement



(3) Temporal aspects

This is reminiscent of the derivational morphology of Semitic languages, as analyzed in McCarthy (1979, 1981). McCarthy named this type of morphology nonconcatenative, to stress the difference between it and the much more typical concatenative or sequential affixal morphology. In such languages, root consonants and morphologically distinct vowel sequences are associated to templates consisting of different prosodic patterns. Even those spoken languages that do have prosodic templates, however, also have a good deal of sequential affixation, e.g., for agreement. So at this point in the discussion, sign languages still look quite different from spoken languages, both because all sign languages seem to have this nonconcatenative type of morphology often called simultaneous, and because it is the most widely known kind in these languages.

We stress that this morphology is not simultaneous in the sense of being superimposed across an entire sign in holistic fashion. In each morphological process just represented, discrete sequential positions are selected for the association of morphological material. However, this material is associated with a position provided by the base sign or by the morphological template, and is not added before or after those positions. It is this superimposition of morphological elements on some part of a sign—a phenomenon that is more formally described as nonconcatenative—which we are calling simultaneous here.

SIMULTANEOUS MORPHOLOGY

Of the many morphological processes in sign languages that have been described as simultaneous in nature, we focus here on verb agreement. This process was first investigated in linguistic detail for ASL by Carol Padden (1988). Recently, Meir (1998; to appear) investigated and analyzed the system in ISL. We briefly review some of the properties of verb agreement, and then discuss what is behind the simultaneous morphology of sign language in general.

Verb Agreement

The simultaneous type we have investigated is verb agreement, a type of inflectional morphology found in all sign languages studied to date. *Verb agreement* in sign languages takes the following form: the beginning and ending points of the agreeing verb are associated with the points in space established for the arguments of the verb. These points have been called referential loci or R-loci by Lillo-Martin and Klima (1990). Consequently, the direction of the path movement of the verb is determined by the locations in space associated with the verb's arguments. The verb agreement systems of sign languages have three verb classes: plain, spatial and agreement (Padden 1988). Plain verbs have invariant beginning and end points; in particular, the direction of the path movement of these verbs is not determined by the R-loci of their arguments. *Spatial verbs* are those whose beginning and end points are determined by spatial referents, that is, locations. In *agreement verbs*, the beginning and end points are determined by the R-loci of their grammatical arguments. Agreement verbs are further divided into regular and backward verbs, the latter having a "backward" movement path (Padden, 1988), determined by the semantics of the verb (Meir, 1998a, 1998b, 2002). Different sign languages resemble each other in both the morphological instantiation of agreement and the meaning of the members of each class. This is not to say that all sign languages have identical agreement systems. Fischer and Osugi (2000), for example, found that in Nihon Syuwa (the Sign Language of Japan), an "indexical classifier," articulated in neutral space by the nondominant hand, marks the locus of agreement. However, in all of these languages, the tripartite classification of verbs still holds, as does the spatial and simultaneous nature of their instantiation.

This presents us with a typological puzzle. All sign languages we know of have this type of verb agreement and verb classification. Yet no spoken language that we know of has the tripartite classification into plain verbs, spatial verbs, and agreement verbs, and none show the particular sort of agreement found in sign languages. How can we account for this difference between signed and spoken languages?

Solving the puzzle involves the characterization of the morphological mechanisms involved in marking agreement in sign languages. Agreement verbs are composed of two argument-marking morphemes, each encoding a different aspect of the verb-argument relations, according to Meir's analysis. The path movement encodes the spatial thematic relations between the verb and its arguments: the direction of the verb's path is from the thematic source to the thematic goal. The facing of the hands encodes the syntactic relations between them: the hands face the syntactic object. The crucial point for accounting for the typological facts is the path movement morpheme, glossed as PATH, and, more specifically, the manner in which it encodes spatial relations. *PATH* is an iconic representation of its meaning—a unidimensional space with direction.

Sign languages, as languages transmitted in space, can represent this source-goal spatial relation iconically, and they all seem to exploit this possibility. This results in an identical verb classification in different sign languages. In spoken languages, however, it is physically impossible to express PATH directly. The expression of spatial relations in spoken languages is necessarily arbitrary, and therefore different languages may develop different means for encoding them, resulting in great differences among spoken languages. The striking cross-linguistic sign language similarity might suggest that languages—any languages—will use iconicity if they can. Sign languages, unlike spoken creoles, have extensive complex verb inflection. However, this inflection is an iconic representation of universal conceptual structures. What we find then is that sign languages develop complex morphology in case the morphology is an iconic representation of a conceptual category or relation. The universality of these categories and relations, and the fact that they can be represented directly in manual–visual languages, determine the similarity in form and structure among sign languages.

What Lies Behind the Simultaneity of Sign Language Morphology?

We have already said that the visuospatial nature of the medium accounts for certain types of morphology across sign languages, specifically, those morphological processes like verb agreement in which spatial relations can be directly represented by the hands. As we show presently, visual properties and spatial relations involved in the motion and location of objects that can be directly represented also occur abundantly in sign languages, in particular, in their classifier systems.

Another effect of the ability of sign languages to represent objects and events iconically is simultaneity of structure. In the physical act of giving, for example, the agent, theme and recipient are simultaneously visible and involved, and their expression in an agreement verb is similarly simultaneous. The simultaneity of sign languages has been explained on different grounds, namely, that it results from production and perception constraints . We believe that an explanation in terms of production and perception constraints is not an alternative explanation to ours, but rather that the two approaches address somewhat different issues, and that they complement each other. Emmorey (1995, in press) argued that vision, unlike audition, can easily perceive in parallel fashion information that is spatially disparate. In other words, the visual processing system is not overburdened by the simultaneous presentation of distinct units of information. If correct, this may explain in part why the morphological formatives are simultaneously encoded;

they can all be perceived at once. From the production perspective, it has been found that signs take a good deal longer to produce than spoken words, but that the length of a given proposition in English and ASL is about the same (Bellugi & Fischer, 1972). The latter authors suggest that constraints on short-term memory for processing the content of linguistic propositions may well be a factor here.[5] Production and perception constraints, then, can account for simultaneity, in both phonological and morphological structure. They can explain the strong tendency of signs to adhere to the LML template introduced above, the tendency of morphological processes to be simultaneous, and the tendency even of the products of concatenative morphological processes, such as compounding and "negative incorporation" in ASL, to conform to the canonical LML template over time (Sandler, 1993).

However, these constraints cannot predict which morphological categories are more likely to be encoded by simultaneous morphology, nor can they account for the fact that certain specific categories are encoded in a very similar way in all sign languages. Furthermore, they cannot explain the fact that the same categories that occur universally across sign languages are those that iconically reflect visuospatial structures. Our model addresses precisely these latter issues. It predicts that the categories that are likely to be encoded by complex simultaneous morphology are those whose real-world simultaneity of occurrence can be represented iconically. It is the iconicity of these categories, made available by the modality, that accounts for the cross-linguistic similarities among different sign languages, and the differences between sign languages and spoken creoles. These observations suggest that production and perception constraints, as well as the availability of iconinc representation of certain conceptual categories, both specific to the visuospatial modality, together conspire to yield the specific morphological structures that characterize sign languages, and sign languages only.

Despite the clear tendency toward nonconcatenative morphology, however, sign languages also take advantage of the concatenative or sequential option that is universally available to human language. We now turn to linear affixation in sign language.

SEQUENTIAL AFFIXATION IN SIGN LANGUAGES

In addition to the nonconcatenative processes found in sign language morphology, the concatenative or affixal kind, although understudied, also exists. We have investigated one affix in ASL—a negating suffix—and three in ISL—a perception–cognition prefix, a case marked pronoun that is in the process of becoming an enclitic, and a negating suffix that is quite different from the ASL negative suffix. We briefly describe those affixes below. We then turn to a model that attempts to explain the occurrence and properties of both sequential and simultaneous morphology found in sign languages.

The ASL '-ZERO' Suffix

The ASL negative suffix appears to be indigenous to the language, and grammaticalized from an independent word (Aronoff, et al., 2000; Sandler 1996a). Glossed ZERO, and translated 'not (verb) at all' the form is argued to be a suffix rather than an independent word for several reasons.

* Its order with respect to the verb is fixed and the verb-ZERO form cannot be interrupted with other words.

FIG. 3.1. ASL—ZERO suffix: UNDERSTAND–ZERO ('not understand at all').

* For some signers at least, the verb and suffix are fused phonologically and are obligatorily characterized by the same nonmanual articulations and postures.
* Some verb+ZERO forms have taken on special meanings that are not directly retrievable from the components.
* There is much variation across signers in this form's use, productivity, and ability to affix to verbs versus adjectives, from which we conclude that ZERO is still undergoing grammaticization.

The ZERO suffix also appears to have the properties of an affix as opposed to a clitic, according to criteria proposed in Zwicky and Pullum (1983). It is selective about roots, at least for some signers. It is phonologically nonneutral (changing the form of the base) in the following ways: it reduces lexical double movement to single movement (e.g., in READ-ZERO and DOUBT-ZERO), and it may delete the final location of the base (e.g., in SEE-ZERO). Finally, some forms negated with the ZERO suffix have semantically opaque meanings (e.g., TASTE-ZERO, 'not my type' and TOUCH-ZERO, 'not use').

Fig. 3.1 shows the ASL suffixed form, UNDERSTAND-ZERO, meaning 'not understand at all'.

Other affixes exist in ASL that have not been studied much yet. Well-kown ASL affixes are the comparative and superlative suffixes and the agentive suffix. Comparative and superlative suffixes are productive suffixes in ASL, possibly derived from the independent sign, MOST. There is also an agentive suffix that had been thought to have been borrowed by analogy with English -er. T. Supalla (1988) suggested, on the basis of evidence from early movies of ASL signers, that the form was actually grammaticized from a native ASL sign meaning 'person'. Whatever its origin, whether through borrowing or through grammaticization, the synchronic agentive ASL suffix has a different distribution pattern than English -er, creating, for example, LEARN-agentive (English: student, *studier), TYPE-agentive (typist, *typer), and OPERATE-agentive (surgeon, *operater).

ISL Sense Prefixes

In ISL, a set of prefixes has been discovered (Aronoff et al., 2000). These prefixes, which attach to verbs, nouns, and adjectives, appear to have descended from signs indicating sensory percep-

FIG. 3.2. ISL sense prefix: EYE-SHARP ('discern by seeing').

tion or cognition, and can be used to create forms that tend to bear meanings of the general form 'to do something by seeing/hearing/smelling (intuiting)', etc. For example, EYE-SHARP, pictured in Fig. 3.2, means 'to discern by seeing'. So far, about 70 such forms have been recorded.[6] There are good reasons to believe that the "sense" parts of these forms have become prefixes:

* Some prefixes have opaque meanings, e.g., EYE-RABBIT-EARS-DOWN, 'chicken out'.
* They always create verbs, even if the base to which they attach has no independent meaning or part of speech, or has a different part of speech, as in the case of SHARP.
* They obligatorily precede their base.
* Words cannot be inserted between them and the base.

Idiosyncrasies such as opaque meaning and less than full productivity are generally typical characteristics of stem level affixes (Aronoff & Sridhar 1987). Indeterminacy of the lexical category of the base is an additional idiosyncratic property of this ISL affix.

ISL Case-Marked Pronoun Enclitic

Another example of concatenative morphology in ISL that has developed through grammaticization is a particular pronominal sign, which is cognate to the sign PERSON in the language. Its function is to mark the (pronominal) human object of certain verbs, mainly psych verbs (e.g., WORRY, BE-ANGRY-AT), verbs with malefective meaning (e.g., INSULT, INFORM-ON, EXTRACT-INFORMATION-FROM) and verbs that select a "content" object (e.g., TALK /WRITE/ASK/READ [about]). This marker is analyzed as a case-marked pronoun (Meir, 2000), forming a paradigm with the unmarked indexical pronoun. There are distributional as well as prosodic clues indicating that this form is on its way to becoming a clitic.[7] It usually occurs right after the verb, with no other signs (such as negators) intervening in between, although in very specific contexts, such as for indicating contrast, the sign can occur in topic position, preceding its verb. Another indication that the form is cliticizing is the spreading of lexical facial expression characterizing specific verbs over the pronominal sign.

Unlike verb agreement, the case-marked pronominal clitic is apparently found only in one particular sign language, ISL. Some sign languages do not have a comparable form at all (ASL, Auslan, BSL). In other sign languages, such as Swedish Sign Language (Brita Bergman & Inger Ahlgren, personal communication, March 19, 1998) and German Sign Language (Rathmann, 2000), one finds a pronominal form that resembles the ISL PERSON pronoun. However, what little is known at this point indicates that there are important differences in the function, distribution, and co-occurrence restrictions of the form in each of these sign languages.

The ISL Negative Suffix

There are many different signs that have negating functions in ISL, including some that are formationally and semantically similar to the ASL -ZERO form. Unlike -ZERO in ASL, however, those negating signs of ISL function as independent words and not as affixes. They can be ordered in different ways in relation to other words in the sentence, and other words can come between them and the word they modify. Recently, however, a negative form has been discovered that behaves like a true affix. Like the other affixal forms discovered, it originated as an independent word and has been grammaticized. This ISL suffix has the meaning 'without', like the -less suffix in English (homeless). It is apparently grammaticized from an independent word meaning 'none'. Fig. 3.3 shows the suffixed word, ENTHUSIASM-NONE, 'without enthusiasm'.

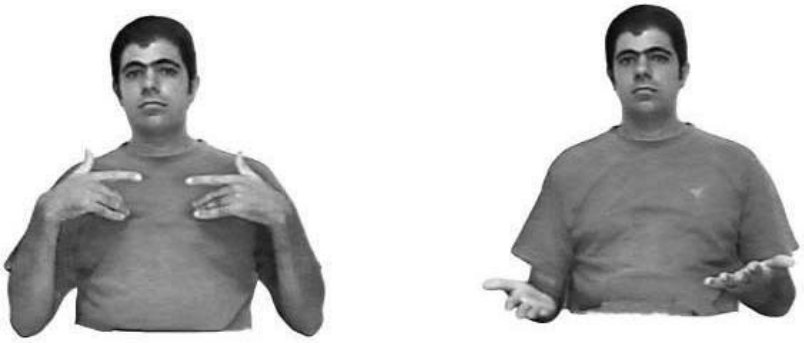


FIG. 3.3. ISL negative suffix: ENTHUSIASM-NONE ('without enthusiasm').

THE UNIVERSAL AND THE PARTICULAR IN SIGN LANGUAGE MORPHOLOGY

Because sign languages are new languages like creoles, sign language researchers have been puzzled by the fact that, unlike creoles, they exhibit complex morphology (see, e.g., Gee & Goodhart, 1988). In our investigation of sequential and simultaneous morphology in ASL and ISL (Aronoff et al., 2000), we saw some generalizations about the two types that led toward an explanation. These generalizations are summarized in Table 3.1.

The explanation that emerges through considering these clusterings of properties is quite simple. The properties associated with the sequential morphology are what might be expected in a young language. The affixes have arisen through the normal historical course of

TABLE 3.1

Two types of sign language morphology[8]

Simultaneous	*Sequential*
Related to spatial cognition	More arbitrary
Productive; no lexical exceptions	Less productive to unproductive
No individual variation	Individual variation
Semantically coherent	Less semantically coherent
Universal across sign languages	Tied to specific sign languages
Morphologically underspecified	Grammaticized from free words

grammaticization by which affixes develop in any language modality. Because grammaticization of affixes takes time, the limited nature of affixal morphology in sign languages may be more the result of the youth of these languages than the result of their modality.[9] The simultaneous morphology and its characteristics, on the other hand, may be expected in sign languages despite the fact that they are creoles. This is because sign languages are uniquely suited to reflecting spatial cognitive categories and relations in a direct manner, as our earlier discussion of verb agreement showed. Thus, the key to understanding the difference between spoken creoles and sign languages is the facility with which the latter may represent iconically certain conceptual functions. Because of the unique compatibility of form with meaning available to sign languages, they retain their simultaneous morphology even as they add sequential morphology, which eventually becomes established and conventionalized. The arbitrariness of linguistic signs is considered by most linguists to be a defining property of natural languages. Our line of reasoning, developed more fully in Aronoff et al. (2000), suggests that iconicity is a desirable property in language, but that it is not found much in spoken languages because they are not suited to extensive use of direct mapping between form and meaning. Languages that are produced by two intricately manipulable articulators and perceived visually are suited to such direct mapping. Sign language signs are iconic because they can be. Spoken language signs would be iconic if they could; because they cannot be, they are arbitrary.[10]

CLASSIFIERS

One of the most frequently noted properties of sign languages is their apparently universal use of a system that depicts the movement and location of objects in space. In an early description of this system, T. Supalla (1982, 1986) called the nominal elements classifiers, linking them to noun classifiers found in certain spoken languages, notably native American languages.[11] Recently, there has been some debate over how similar such forms are to their counterparts in spoken languages (see, e.g., Schembri, chap. 1, this volume). We consider the label ‘classifiers’ to be acceptable for the sign language forms in question, according to the generally accepted definition of such forms: morphemes that classify nouns according to semantic criteria (see Senft, 2000a, 2000b).

Of the myriad types of noun classification found in spoken languages, sign language classifiers are best compared to what Grinevald (2000) called verbal classifiers—classifiers that take the form of verbal affixes.[12] In addition to formal categorization, Grinevald offers a semantic

typology of classifiers, of which two types are clearly similar to those found in sign languages: 'essence categories', and 'physical categories'. Two examples will suffice, one from Cayuga, and one from Digueño. In each example, the classifiers are printed in boldface type. The Cayaga example *treht-* (VEHICLE) falls into the 'essence' category of verbal classifier. It is comparable to sign language 'semantic' or 'entity' classifiers, on semantic grounds, and also on morphological grounds, in that it is a bound morpheme, like the ASL VEHICLE classifier. Here we use the term 'entity classifiers' for these forms, already current in the sign language literature (Engberg-Pedersen, 1993; Schembri, chap. 1, this volume).

(1) Cayuga (Mithun 1986; pp. 386-388)
Skitu ake'-**treht**-ae'
Skidoo I-CL (vehicle)-have
"I have a skidoo.'

The prefixes in the Digueño example, are classifiers that refer to some physical property of a nominal; a LONG OBJECT, a SMALL ROUND OBJECT, or a BUNCH OF OBJECTS, in these examples. In Grinevald's semantic categorization, these are of the type that represent 'physical categories'. As bound forms classifying nominals according to physical properties, such classifiers are comparable to Size and Shape Specifiers of sign languages (T. Supalla, 1982), such as SMALL-ROUND-OBJECT, CYLINDRICAL OBJECT, FLAT OBJECT, etc.[13]

(2) Digueño (Langdon, 1970, p. 78; cited in Grinevald, 2000)

a'mi… 'to hand (a long object)'
tumi… 'to hand (a small round object)'
a xi … 'to drag (a long object)'
c' xi … 'to drag (a bunch of objects)'

These examples are not identical to the classifiers of sign languages, neither in form nor in distribution. But using the same label for these morphemes in spoken and signed language—justified on definitional grouns—has the advantage of encouraging comparison among the various classifier systems, which is likely to result in a better understanding of sign language classifiers and their behavior. In any case, for us, the fact that sign language classifiers do not behave identically to those of Cayuga or Digueño does not justify removing the label, 'classifier' from the sign language forms, any more than it would be justified to say that the Cayuga forms are not classifiers because they are not the same as the Digueño classifiers, or to call neither of them classifiers because both are different from the numeral classifiers of Kilivila (Senft, 2000b).

It may be useful to mention also two types of classification that are not comparable to those of sign languages. Sign language classifiers are not similar to the classificatory verbs of Navajo and other languages with which they have sometimes been compared.[14] In fact, Grinevald (2000) argues that such verbs do not involve classifiers in spoken language either, as the 'classification' is achieved by suppletive verb stems and not by any nominal element. Nor are sign language classifiers comparable to the numeral classifiers that figure prominently in Allan's (1977) survey, which are more blatantly classificatory in nature than are verbal classifiers.

It seems that verbal classifiers (unlike numeral classifiers) often play a stylistic role in shaping a discourse—referent tracking, backgrounding, modifying, etc.— and that their classifica-

tory function may be secondary. So, it is not only the semantics and affixal character of verbal classifiers that allow for a comparison with those of sign languages, but some of the expressive functions they perform as well. Due to space considerations, we will not elaborate here, but we refer readers to Sandler & Lillo-Martin (in preparation) for a more detailed discussion of classifiers in spoken and signed languages.

Relevant to our discussion is Supalla's distinction between those classifier constructions which involve use of hands and those which involve use of the body or body parts. In the former, there are several categories of forms, including (a) size-and-shape specifiers (SASS) which depict shapes, outlines, and relative sizes of objects[15]; semantic classifiers or (b) "entity classifiers" (Engberg-Pedersen, 1993; Schembri, chap. 1, this volume), which are less depictive and represent a broad class of noun objects; and (c) handling classifiers, which represent the human hand manipulating an object. In all these forms, the hands are depictive of features of objects, either their physical features or more abstract semantic features. In contrast to classifier constructions involving the hands, Supalla refers to what he calls *body classifiers*, in which the signer's head and body take on animacy, and become representative of the body of the animate referent, including head, limbs and torso. In the Nicaragua study (Senghas, 1995; Kegl et al., 1999), such expressions are called *whole body signs*. Engberg-Pedersen (1993) also described how the head and body are used in this system, but she referred to the body classifier as a "referent projection," where the referent or entity is projected to the body. Without taking a position as to whether the body acts as a classifier in these forms, or whether or not the resulting structures are discrete signs as the term whole body sign implies, we adopt Engberg-Pedersen's (1993) neutral term and call them referent projections.

Classifier Constructions in ASL and ISL

Our study relies primarily on two sources of data. One is a videotape of a collection of short narratives especially rich in classifier constructions, created for training interpreters (Interpreting Consolidated, 1998). This tape was translated into written Hebrew and then into ISL by our consultants. The other is the elicitation of a range of classifier constructions in the two languages, in isolation and in specially created contexts, conducted in our lab by Carol Padden working with ISL consultants. In both cases, we were comparing the same types of data in the two languages. All data were recorded on videotape.

In the context of our research program, we are interested in the nature of classifier constructions in the two sign languages we are studying at a descriptive level, and in how these structures can help us develop an explanatory model of sign language morphology. We pay special attention to different devices that may be used within the classifier system for essentially the same function: the use of the hands versus the use of the body, and the use of entity classifiers versus the use of SASS classifiers. After discussing these devices in ASL and ISL, we turn to their implications for our model.

The Hands Versus the Body. ASL commonly uses hand classifiers to depict animate entities in motion. For example, in the sentence, *The man took his dog for a walk*, a signer could use either an upright index finger, indicating 'upright human walking' or an inverted V hand with fingers wiggling to depict walking. Simultaneously the other hand could be characterized by a bent V 'crouch' shape to represent 'animal walking'. Or, to depict two birds sitting on a tree branch, ASL signers would use both hands in V-crouch adjacent to one another.

In more performative ASL, or ASL used in storytelling, signers tend to use more referent projections (i.e., body classifiers or whole body signs). For example, a signer might use reference projection to show the demeanor and gait of a man walking and holding a leash, then quickly change the body demeanor to show a dog with front legs walking. It is understood from the quick sequence that the object at the other end of the man's leash is an animal, but the body does not move from side to side, nor are the signer's legs involved. Instead, the body remains fixed as the hands are used to depict the walking gait of the legs. After the event is expressed on the hands, the following sequence is expressed by the body:

(Man) TORSO-SWAYS. RIGHT-ARM-HANDLING-LEASH (Dog) TORSO-LEANS-FORWARD. ARMS-EXTENDED-OUTWARD-WITH-FISTS-ALTERNATING MOVEMENT.

In everyday language, signers can switch between hand classifiers and referent projections. When this occurs, referent projections are normally used briefly; long sequences of referent projections are seen as more appropriate for storytelling or poetic forms than for conversational ASL.

In ISL, we find more frequent and more extended use of referent projections in everyday conversation. Hand classifiers, particularly of the kind where each of the hands represents a different entity, are less common, though not absent. For a dog and a cat sitting together on the floor, ASL signers would commonly use the two hands in adjacent V-crouch form, but in ISL, we saw instead an example of a signer using his own upper body to show the body of the dog with the paws under the chin, then changing his body position and configuration to show the cat lying on one side with the front legs extended out. The comparison is shown in Fig. 3.4. in another example. An ISL signer used two different types of body projections to indicate a dog walking and a cat walking. ASL signers can also use such body forms but would tend to do so either while performing a story or in rapid sequence with hand animate entity classifiers.

In describing the use of agreement verb forms in Danish Sign Language, Engberg-Pedersen (1993) observed that older signers use fewer agreement forms marking first person patient or indirect object agreement. Instead they "use their head and body as referent projections in constructions with polymorphemic verbs" (p. 294), where the body becomes the recipient of an action, rather using the hands to direct the verb toward the R locus of the patient argument. Her observation suggests that over generations of Danish signers, there are changes in use of the body in agreement. When comparing ISL and ASL, we also see different emphases in use of the body, not to mark agreement, but in the use of classifier constructions. It is not our argu-

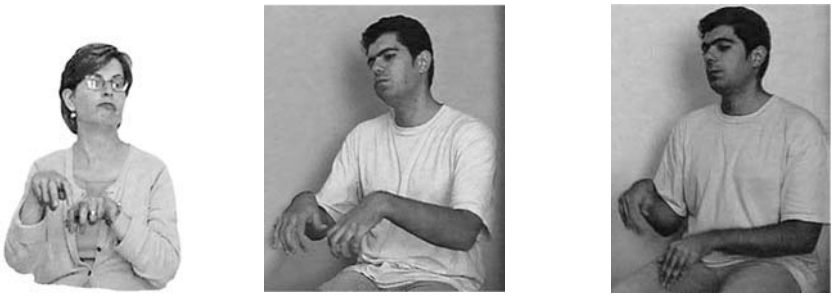


FIG. 3.4. ASL hand classifiers versus ISL referent projections: (a) FOUR-LEGGED ANIMAL (ASL) (b) DOG (ISL) (c) CAT (ISL).

ment that referent projections disappear in ASL; indeed they remain robust especially among popular storytellers. Referent projections are layered among conventionalized hand classifier forms. But in ordinary conversations in ASL, they are deemphasized in favor of SASS or entity classifiers.

Entity Versus SASS Classifers. In ASL, we also see more entity classifiers than SASS or handling classifiers compared to ISL. SASS and handling classifiers both represent a physical feature of a referent, be it its size and shape, or the shape of the hand in handling objects of different shapes or dimensions. Entity classifiers, or "semantic" classifiers in Supalla's terminology, categorize by membership in a semantic class that is more abstract than those of size-and-shape classifiers. The semantic classes are not necessarily determined by explicitly visual features; hence, the handshape representing the class is less iconic. ASL has two entity classifiers with particularly broad membership: the well-known VEHICLE classifier, and the A-upright, or OBJECT classifier pictured in Fig. 3.5. The ASL VEHICLE classifier can be used for cars, trucks, bicycles, trains, boats, submarines, and sometimes motorized wheelchairs. What the referents have in common is their semantic status as transportation vehicles; hence their classification as entity classifiers. In ISL, the classifier used for CAR can also be used for TRUCK (flat B-hand) but the upright B-hand is used for bicycles and trains. Neither can be used for BOAT; instead the two hands are used together to show the movement and general direction of the vessel. A submarine uses yet another handshape classifier. The shape and orientation of the referent determine the choice of classifier in ISL, as is typical of SASS classifiers.

The other ASL entity classifier with broad class membership is the A-UPRIGHT or OBJECT classifier, which can be used for an object as large as a building or as small as a vase on a shelf. For knickknacks of varying sizes and shapes arranged on a shelf, the OBJECT classifier can be used to show each, although their physical features may be very different, from a small sculpture to a vase or a china dish. In ISL, there is a "row" classifier, showing that objects are lined up on a surface, but to show each object would require the use of different size-and-shape specifiers. ASL also can show featural properties of each, by using a SASS to represent each different object on a shelf, but again, such forms are used when the detail is desirable. Otherwise the OBJECT classifier is used broadly for those objects.

Although we have found entity classifiers like LEGGED-ANIMAL in ISL, we have so far found none that are as abstract in meaning and form as the two ASL entity classifiers just described.

(a) (b) (c) (d)

FIG. 3.5. ASL entity classifiers (a) VEHICLE; (b) OBJECT (A-UPRIGHT), ISL SASSes (c) FLAT-OBJECT (CAR); (d) FLAT-OBJECT (BIKE).

Classifier Constructions and Sign Language Morphology

Our model of sign language morphology provides a context for understanding classifier constructions in the two sign languages. These structures, which involve complex simultaneous morphology and are related to the encoding of the motion and location of objects in space, are found in ASL and ISL, and apparently in all sign languages, as the model predicts. Yet there are notable differences between the two languages under study here, mainly in the ways the objects themselves are represented. We suggest that the differences, like the similarities, can be captured in our model. Both languages encode an event of motion by a complex, simultaneous morphological structure: the co-occurrence of the path movement with a particular handshape representing an object. This puts both languages in the *motion+figure* category in Talmy's (1983) typology. Additionally, both languages follow similar restrictions concerning those aspects of a motion event that may be encoded in classifier constructions. (See Talmy, chap. 8, this volume, for a detailed presentation of these restrictions.) These similarities are related to the manner in which the languages conceptualize an event of motion. As such, they are related to spatiotemporal cognition, and conform to our hypothesis that sign languages generally will have complex simultaneous morphology if it is a direct representation of spatiotemporal categories and relations.[16]

But classifier constructions also represent the object that is in motion or being located. And it is in this respect that we find differences between the two languages. One difference is between representation of the object on the hands, making the resulting form appear similar to conventionalized lexical signs, and mapping of the body of the referent onto the body of the signer, which is more motivated, or iconic. The other difference is whether the handshape represents a visual feature or a less iconic semantic feature of the object. We suggest that both of these differences may be attributed to the relative age of the two languages. In our earlier work, summarized in sections 4 and 5, we suggest that the relative scarcity of more arbitrary morphology appears to be a function of the relative youth of sign languages in general. On a continuum from motivated/iconic to arbitrary/abstract, our comparison of classifier constructions in ASL and ISL indicates that ASL is farther toward the arbitrary/abstract end than is ISL. Our model explains this difference in terms of language age.

The classifier systems of both sign languages are still relatively iconic, as our model predicts, because they reflect visuospatial properties of things in the world. And even as they move toward the more arbitrary, they still reflect their iconic origins. This makes classifier systems inherently different from the far more arbitrary affixes described in section 4 above, a difference that is also explained by our theory.

In the case of referent projections, we argue that older sign languages have conventionalized forms that are broader in category and more free of the constraints of the body—its physical fixedness and its starkly human and animate features. Historical work on the ASL lexicon has shown a tendency for signs to evolve from more iconic to more arbitrary in form (Frishberg, 1975). Our argument here, though related, is different from Frishberg's in two ways. First, we are dealing with the issue of arbitrariness in classifier constructions and not lexical items. Second, we are not arguing that sign languages develop toward more arbitrary or conventionalized forms in lieu of the more motivated or iconic ones. Instead we find that the body remains active even in older sign languages, appearing in sequence along with conventionalized forms, and returning full force in performance, where the detail and richness of the body can be exploited for dramatic effect. Crucially, our argument is that the difference between older and younger sign

languages is not the presence or absence of referent projections versus classifier constructions, but differences in emphasis and in layering together of the two types of forms.

The ASL entity classifiers, which we described above as less iconic and more general in meaning than ISL classifiers representing similar concepts, may have followed the grammaticization path described in Zeshan (chap. 6, this volume). They may have undergone "desemanticization," from meanings that are more transparent to those that are more arbitrary and abstract. As grammaticization is a diachronic process, this is compatible with our suggestion that the age of a sign language is a factor in the development of classifier systems.

We are aware that we are comparing two different sign languages and not two stages of the same sign language. But it is significant in our view that all sign languages we know of use classifier constructions involving the same types of classifiers. The striking resemblance of this system across sign languages makes it reasonable to entertain our hypothesis that the particular kinds of differences we have found between a newer and an older sign language represent the diachronic development of classifier systems within a single sign language as well.

THE LEXICALIZATION OF CLASSIFIERS

The differences between classifier constructions in ASL, an older sign language with a large community of speakers, and ISL, a newer language with a smaller community, suggest that the system may become somewhat more arbitrary over time. A quite different diachronic process involving classifiers has been noted by researchers of several different sign languages. This is the entry of classifier constructions into the so-called frozen lexicon as simplex monomorphemic words (e.g., Engberg-Pedersen, 1993 [Danish SL]; Klima & Bellugi, 1979 [ASL]; McDonald, 1983 [ASL]; Schembri, 2000 [Australian SL]; Shepard-Kegl, 1985 [ASL]; Zeshan, chap. 6, this volume [Indo-Pakistani SL]).

Consider, for example, the ASL sign, FALL, shown in Fig. 3.6. It apparently originated as a classifier construction in which the hand represents the legs classifier of two-legged animals. Although the classifier construction handshape can only represent the class of nouns it classifies, namely, two-legged animals, the frozen sign has become more general in its semantic interpretation, taking also apples, boxes, even rocks as possible themes. The handshape, location, and movement components no longer have distinct meanings in the lexicalized sign. Formationally, the frozen form and the classifier construction are distinct as well. The movement and the originating location of the extant classifier construction may vary according to the event being described. The hands may begin at virtually any spot in the signing space and then move in one of a variety of patterns from straight to arc to spiral, for example. The frozen sign is

FIG. 3.6. ASL 'frozen' sign, FALL.

much more restricted in form. It is limited to a single rotating movement from a relatively high position in neutral space in front of the torso, to a relatively low one (Supalla, 1986).

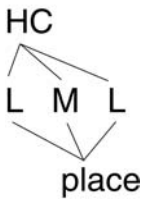
Although classifier constructions are sometimes referred to as verbs (e.g., T. Supalla, 1982) and by implication as words, we argue that they have no inherent prosodic structure of their own—they are not necessarily words. Rather, classifier constructions can span prosodic domains of various sizes, including entire intonational phrases and up to phonological utterances, in the terminology of Nespor and Vogel (1986). But when classifier constructions enter the lexicon, they assume the form of self-contained words, obeying strict constraints that generally characterize prosodic words (Sandler, 1999a, 1999b). In particular, as prosodic words, they conform to the tendency toward monosyllabicity and to Battison's (1978) dominance and symmetry conditions. We elaborate the formal process of lexicalization of classifier constructions in the next section.

The Prosodic Transition from Classifier Constructions to Prosodic Words

A *word* may be defined in terms of its morphosyntactic structure; e.g., its part of speech, meaning, morphological constituency, etc. But the phonological form of a word is also important to its definition and behavior in any given language. One aspect of phonological form is prosodic. For example, in spoken language, answers to the following questions determine the prosodic form of words: What is the shape of its consonant–vowel patterns? How many syllables may it have? How is stress assigned? In order to prepare the ground for our documentation of the journey of a classifier construction into the lexicon, it is necessary to sketch two types of prosodic constituents in sign language: the *prosodic word* and the *intonational phrase*.

Prosodic Words. The words of sign languages generally have a relatively uniform canonical phonological structure, shown schematically in section 2 and repeated here.

(4)



This representation encodes the widely observed generalization that signs tend to be monosyllabic (e.g., Coulter, 1982; Sandler, 1989), specifying only two locations and a single movement from one to the other.[17] The single, multiply-associated representation of hand configuration reflects the selected finger constraint, which requires there to be only be one group of selected fingers in a sign (Mandel, 1981). Two-handed signs have two severe restrictions on the nondominant hand, expressed by Battison (1978) in his Symmetry Condition and Dominance Condition:

> (1) The Symmetry Condition states that (a) if both hands of a sign move independently during its articulation, then (b) both hands must be specified for the same handshape, the same movement (whether performed simultaneously or in alternation), and the specifications for orientation must be either symmetrical or identical.
>
> (2) The Dominance Condition states that (a) if the hands of a two-handed sign do not share the same specification for handshape (i.e., they are different), then (b) one hand must be passive while the ac-

tive hand articulates the movement and (c) the specification of the passive handshape is restricted to be one of a small set: A,S,B,G,C,O.[18] (pp. 34–35)

The Dominance Condition and Symmetry Condition are inviolable in words of the lexicon. The selected finger constraint and the monosyllabicity constraint are only systematically violated in words that have more than one syllable, in which each syllable is a morpheme.[19] However, classifier constructions freely violate all of these constraints—monosyllabicity, selected finger, symmetry, and dominance—regardless of internal morphological structure. Assuming that these are constraints on prosodic words (see Brentari, 1998; Sandler 1999a, 1999b,), we conclude that classifier constructions do not have the phonological form of prosodic words.[20]

Battison's conditions on the two hands are violated in classifier constructions in ASL and ISL, as well as in Danish Sign Language (Engberg-Pedersen, 1993), Swedish Sign Language (Wallin, 1994), and possibly other sign languages. Let us take an example from ISL. If the nondominant hand represents a ground classifier, such as an 'airplane' in in an expression meaning, 'A person approached an airplane (on the runway)', it may assume a marked handshape—here the Y shape—violating the Dominance Condition,[21] as shown in Fig. 3.7.

The Symmetry Condition is also violated. In a story we recorded about a recalcitrant dog that had to be dragged by its leash behind its master, the two hands each moved but were characterized by different shapes, shown in Fig. 3.8. In this example, the movement was different for each hand as well. The 'person' hand moved in a straight path, while the 'dog' hand wiggled back and forth at the wrist as it followed the direction of the 'person' hand.

Clearly, this freedom of configuration and movement results from the fact that each hand functions as a figure in this expression. *Figure* is a vague term that corresponds to the salient element in a scene (Talmy, 1983), and can translate to any of a number of semantic and syntactic roles. Semantically each figure could be an agent or a patient. The two figures could conceivably play the same semantic role (e.g., patient) or different ones. This indicates that the semantic and syntactic structure of classifier constructions may be very elaborate indeed.[22] As prosody is intimately connected to both syntax and semantics, we believe that

FIG. 3.7. Static nondominant hand with marked shape: 'A person approached an airplane' (ISL).

FIG. 3.8. Two hands moving, with different handshapes: 'A person walks dragging dog' (ASL).

analysis of the prosodic structure of classifier complexes must play a role in any future syntactic and semantic investigations.[23] We must leave detailed syntactic and semantic analyses to future research, however, and restrict ourselves here to the form and in particular to the prosodic constituency.

Intonational Phrases. From the discussion so far, one might conclude that classifier constructions are just ill-behaved words. But it seems rash to call them words at all, because they may span much larger prosodic domains than words. We show here that a classifier construction may spread across much larger constituents than the prosodic word, even spanning a sequence of intonational phrases. First, we provide a brief and, we hope, intuitively accessible sketch of the intonational phrase in an ordinary sentence of a sign language. We then show that a classifier construction whose parts mean 'VEHICLE RIDE' may span more than one of these.

In a study of prosody in ISL, it was found that the prosodic constituents Phonological Phrase and Intonational Phrase are marked by clear phonetic correlates (Nespor & Sandler, 1999; Sandler, 1999b). These constituents are arranged in the following prosodic hierarchy, adapted from Selkirk (1984) and Nespor and Vogel (1986):

(5) syllable>foot>prosodic word>phonological phrase>intonational phrase>phonological utterance

We have already seen that classifier constructions do not observe constraints on prosodic words: Unlike typical prosodic words, classifier constructions are often disyllabic or multisyllabic, and the constraints on two-handed signs do not hold. We have also seen that each hand may play an independent syntactic and semantic role, which in principle opens the door to extremely complex classifier structures. As prosodic constituency is related to (though not necessarily isomorphic with) syntactic constituency, it is expected that classifier constructions may also comprise higher prosodic constituents than the prosodic word; and indeed they do.

Certain syntactic constituents form intonational phrases in many languages. For example, parenthetical constituents, nonrestrictive relative clauses, topicalizations and other types of expraposed elements all typically constitute intonational phrases. Examples of topicalized constituents that form their own intonational phrases in English and in ISL are shown in (6), taken from Nespor and Sandler (1999). In English, the topicalized constituent is *that movie*, and in ISL, it is CAKE.[24]

(6) English: [That movie]$_{I}$ [I would never see]$_{I}$
ISL: [CAKE]I [I EAT-UP DEPLETE]I 'I ate the cake up completely'.

In both language modalities, intonational phrasing may vary depending on speed, register, and other factors. The intonational phrase is the domain of intonational tunes in spoken language (e.g., Hayes & Lahiri, 1991), and is often followed by a breath (Nespor & Vogel, 1986). In ISL, intonational phrases are always marked by a change in head position and a change in all aspects of facial expression (Nespor & Sandler, 1999). The authors argue that this prosodic patterning of facial expression explicitly supports the commonly drawn analogy between facial expression in sign language and intonation in spoken language.[25] In ASL, Wilbur (1999) found that signs have longer duration at the ends of intonational phrases, and the two research projects have found that eyeblinks are common between intonational phrases in both ASL and ISL—as breaths are common in that position in spoken languages.

FIG. 3.9 Two intonational phrases: 'Car turns right || car turns left' (ASL).

Attending to the prosodic structure of classifier constructions, we find that even simple complexes can span more than one intonational phrase. For example, the construction VEHICLE RIDE[26] can continue without rearticulation across several intonational phrases, to convey a meaning such as: 'The car went straight; (the car) turned left; (the car) went over a hill; and (the car) parked at the bottom'. The following example is from such a sequence in ASL. Here we extract 'car turn right; car turn left', which we interpret as two propositions and that comprise two intonational phrases. In the videotape, there is a long hold between the two phrases, and, as can be seen in the extracted pictures in Fig. 3.9, there is a clear change in head (and body) position. These features clearly mark intonational phrase breaks.

ACHIEVING PROSODIC WORDHOOD

As we said in the previous section, when these prosodically indeterminate complexes enter the frozen lexicon, they observe all constraints on prosodic words. In the course of our investigation, we were priveleged to observe the evolution of an ISL classifier construction into a wordlike form in a single discourse segment. In a description of the structure of human bones and ligaments at a joint, the signer began with a series of classifier constructions. A rough translation follows in Fig. 3.10, with classifier constructions glossed with hyphens, and major prosodic breaks marked with double lines: || . The portion in boldface type, describing the ligaments (the extent and spatial relation of the two thin stringy objects), is pictured below.

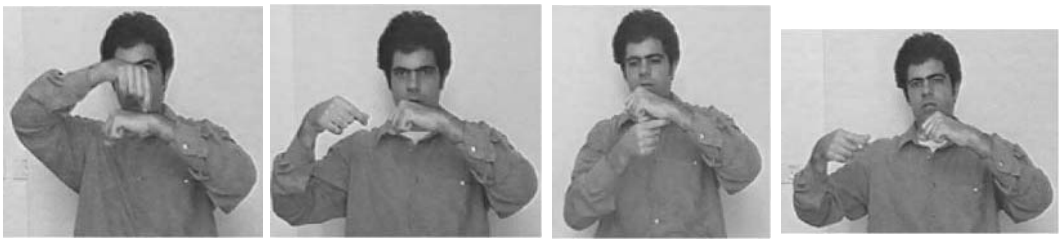


FIG. 3.10. Excerpt from classifier constructions describing a ligament (ISL): Arm || Meet, two-roundish-objects-adjacent-rock-together ||
Thin-stringy-object-extend-from-top-of-roundish-object-in-arc-shape || Thin-stringy-object-extend-from-under-roundish-object-in-arc-shape-to-meet (other thin stringy object).

FIG. 3.11. Novel frozen word, LIGAMENT (ISL).

The sequential form of the material in boldface type is roughly: LML || LML, with an intonation break between the two LML sequences. Specifically, between the two sequences, interpreted as the two sentences printed in boldface type above, there was a long hold and eye contact with the addressee as well as a head nod, clearly marking an intonational phrase break. The whole expression spanned 1,440 ms. It is noteworthy that the classifier for the roundish object is held in front of the signer's face. As signers typically look at the face of their interlocutors and not at the hands (Siple, 1978), placing the hand in front of the face rather than in neutral signing space draws special attention to the form and action they depict, and makes the string anomalous compared to lexical signs.

Within moments, the name of this anatomical structure was reduced to a monosyllabic form that might simply be glossed, 'LIGAMENT'. Though not yet in full conformity in every detail, this sign already fits the canonical prosodic LML structure of a sign language word. It was uttered extremely rapidly, with no intonational or rhythmic break of any kind. The newly formed word, shown in Fig. 3.11, spans only 280 ms. It is signed in neutral space and does not block the face of the signer. Here we note that the facial expression of the signer—squinted eyes—is that used to represent shared information in ISL (Nespor & Sandler, 1999; Sandler, 1999b). In creating a lexical sign for the concept 'ligament', the signer uses this facial expression to call the addressee's attention to the earlier signed classifier construction from which it so quickly evolved.

Because classifier constructions exist side by side with the frozen lexicon in sign languages, words that are diachronically related to classifier constructions can be reinterpreted into their components synchronically. This occurs regularly in ordinary conversation, and is elevated to a stylistic device for humorous effect and in poetry. A typical example from ordinary usage in ISL is the sign WRITE, shown in Fig. 3.12, which presumably originated as a classifier construction consisting of a SASS for flat object (the thing written on), a handling classifier for handling a small thin object, and a reduplicated movement across the palm. We know that the form is listed in the mental lexicon as the word WRITE, both because it is reliably glossed that way in isolation, and because it undergoes temporal aspect inflection for Durational and Continuative, like any verb.

Yet the two parts represented by the two handshapes can be interpreted into their separate classifier components. This possibility is described in Brentari (1995) for ASL and for IPSLin Zeshan (chap. 6, this volume). We elicited a sequence with the meaning, 'I wrote a letter to the editor, and on considering it, saw I hadn't written it as I'd intended'. In this sequence, the unanalyzed sign WRITE, pictured in Fig. 3.12, was signed first, and subsequently the nondominant hand was interpreted as a classifier for the paper on which the writing took place, as shown in Fig. 3.13.

FIG. 3.12. WRITE (ISL).

FIG. 3.13. Reinterpretation of nondominant hand as a classifier for a flat object: 'consider letter' (ISL).

Summary: The Synchronic-Diachronic Perspective

Sign languages, like spoken languages, are dynamic, ever-changing natural communication systems. Focusing on classifier constructions in particular, we have tried to describe in detail the phonological path from multiproposition constructions to "frozen" lexical items and back again. Due to the communicative advantage of iconicity to which sign languages are uniquely suited, we expect classifier constructions to endure over time, side by side with lexicalized forms. However, this investigation also suggests that the nature of classifier constructions as such may change diachronically. Comparison of such structures in two sign languages—one 250 years old with 200,000 signers, and the other under 60 years old with 8,000 signers—suggests that classifier constructions may become more restricted to the hands and more arbitrary over time. With this diachronic perspective in mind, we return to the issue of creolization.

A UG LIGHTNING BOLT OR MORE GRADUAL SYSTEMIZATION?

Senghas (1995) and Kegl et al. (1999) reported on the development of Nicaraguan Sign Language, which they have had the privilege to observe from the ground up in a school in Managua. According to Kegl et al., the Nicaraguan school signers divide up quite neatly into two linguistic groups, which correlate with their age and year of entry into the school. The older group are described as signers of a peer-group pidgin or jargon that Kegl et al. (1999) call *Lenguaje de Señas Nicaraguense* (LSN), whereas the younger group are signers of "the full-blown signed language" (p. 181), called *Idioma de Señas Nicaraguense* (ISN), idioma being the Spanish word for 'formal, national languages'.

Kegl et al. (1999) observed that the two systems can be distinguished, even by a nonsigner, "on the basis of the size of the signing space, amount of symmetry in the use of the hands, [and] degree of involvement of the whole body in signs …" (p. 182). On a more refined level, they mea-

sured the performance on several dimensions of two groups of signers, those born before 1970, whom they characterize as LSN signers, and those born after 1970, whom they characterize as ISN signers. Each signer produced narratives after watching two short nonverbal cartoons. The researchers then counted the occurrence in each group of five types of forms typical of sign languages: verb inflection, size and shape specifiers, handling classifiers, entity classifiers, and signs using the whole body.

Overall, Kegl et al. (1999) found that the younger group produced significantly more verb inflection than did the older group.[27] The younger group also produced more size and shape specifiers than the older group, though this finding is difficult to interpret, both because only the tracing type of SASS was counted in this category, and because mimetic tracing depictions for size and shape were lumped together with SASS constructions. The younger group used significantly more "object" classifiers, but the groups did not differ in their use of handling classifiers. In their object classifier category, the researchers include both SASS classifiers of the nontracing type—e.g., FLAT-OBJECT, etc,—and what we call entity classifiers. Finally, the older group produced more whole-body signs than the younger group. The authors ascribe the differences to the catastrophic change[28] that occurs when a pidgin is replaced by a language, as a result of the "direct contribution of innate language capacities" (p. 212).

Coincidentally, we have studied some of the same structures that the Kegl et al. (1999) study reported on, in particular, verb agreement and classifier constructions. Our findings indicate that the Kegl et al.(1999) explanation, involving the catastrophic intervention of the language faculty, cannot be maintained for the development of these structures in ISL. With respect to verb agreement, Kegl et al. (1999)found that the ISN signers distinguished the same three classes of verbs—plain, agreement, and spatial—that we described above. This particular clustering of generalizations about the verbal categories and main agreement characteristics found in sign languages indicates that something other than an innate language capacity is at work. In particular, these agreement properties appear to be universal across sign languages; they are based on visuospatial cognition; and, although they form an essentially grammatical system, they are unlike verb agreement found in spoken languages in significant ways (Meir, 1998a; Aronoff et al. 2000). If sign languages all have essentially the same agreement system, and it is one that no spoken languages have, then it is not reasonable to attribute its appearance in ISN to an innate and universal language capacity. If such a capacity were responsible, we would expect ISN (and all sign language) verb agreement to have a core of properties that is also present in spoken language, but this is not the case. Rather, ISN verb agreement has the same properties that are found in other sign languages, which, as we have argued, are attributable to universals of visuospatial cognition rather than to universals of language.

Turning to the main focus of this chapter, classifier constructions, our results again lead us to draw a different conclusion from that of Kegl et al. (1999). In particular, the differences that Kegl et al. found between their two groups in the use of whole body signs (referent projections) are apparently similar to those that we found between ISL and ASL. But ISL, unlike the language of the older Nicaraguan signers, is no less regular than ASL. Also, ISL is not a pidgin, and has been around for over 60 years (Meir & Sandler, in press). So the parallels between both pairs—LSN versus ISN and ISL versus ASL—cannot reliably be ascribed to a sudden explosion of innate language capacities.

The comparison of entity classifiers in the two studies is less straightforward than the comparison of reference projections, but still sheds light on the issue. First, it is less straightforward because the Nicaragua study's category of *object classifiers* includes both signs that we call *en-*

tity classifiers, and signs we categorize as (nontracing) SASS constructions (such LONG-THIN-OBJECT, etc.).[29] Second, we focused more on the relative abstractness of entity classifiers in comparing the two languages, finding more abstract entity classifiers in ASL than in ISL, whereas the Nicaragua study only counted the number of occurrences of object classifiers as they define them, finding significantly more instances per total number of signs among younger than among older signers.

What is crucial to the argument in our view is not the relative age of the languages in question, but rather the fact that all signers in both studies—and in fact in all sign languages investigated so far—have SASS, handling, and entity classifiers. This is in sharp contrast to spoken languages, which often have no classifiers, or have classifier systems that may differ radically from language to language (Grinevald, 2000; Senft, 2000b). Once again, the existence of these particular types of classifiers in all sign languages points more to the role of general visuospatial categorization than to an innate language capacity. The fact that sign languages tend to have certain types of structures is not lost on Kegl et al. (1999), who attribute them to "modality-dependent markedness differences" (p. 223). However, we find it difficult to reconcile that the structures representing linguistic innateness are precisely the same structures that are characterized by modality dependent markedness differences.

We conclude, then, that the explicit differences between the Nicaraguan languages do not provide any evidence for an innate linguistic capacity in the sense of a core of linguistic structures. The differences can be more parsimoniously ascribed to the fact that the older children were past the critical period at the time of acquisition, a fact to which Kegl et al. (1999) also attributed a central role. The relevance of the critical period in sign language acquisition is underscored by Singleton (1989) and Newport (1999), who studied the native signing of a young child whose parents were both late acquirers of ASL. Newport noted that the child's signing was much more consistent than that of either parent, and ascribed that difference in consistency to the fact that the child acquired the language during the critical period, which the parents did not. The important finding that younger Nicaraguan signers make more general use of object classifiers than do older signers, although it does not argue for universal language structures, is relevant here. Together with the other differences between the two cohorts, the finding provides striking evidence for the relentless generalization and regularization of linguistic structure that is the privileged province of children. But it does not provide evidence for universal language structures, and not necessarily even for exclusively linguistic structure.

This line of reasoning does not argue explicitly against the notion of an innately specified core of linguistic properties, against Universal Grammar—only against the use of the Nicaraguan situation to support it. External evidence for Universal Grammar will always be tremendously difficult to find, because other possible causes for the relevant phenomena must be ruled out first.

CONCLUSIONS

Our comparison of classifier constructions in ASL and ISL suggests that all sign languages have the same types of structures that have been discussed in the literature on ASL classifiers: SASS classifiers; entity classifiers, handling classifiers, and referent projections. Just as with agreement, these types arise naturally from the visual nature of sign languages.

But there is an interesting difference between the classifier system and agreement. In the case of agreement, the three verb classes and all their properties are found full blown in both ASL and

ISL. In the use of classifiers, we found instead that ISL signers tend more toward the iconic end than do ASL signers. Reference projections are more common in ISL than in ASL, and entity classifiers tend to be more highly grammaticized in ASL than in ISL. In both languages, classifier constructions are also a source of lexicalization, in which the inherent iconicity of each component is diminished and the resulting word thus becomes more arbitrary. In a sense, the classifier system is a middle ground between agreement and sequential affixational morphology, grounded in iconicity like agreement, but susceptible to progressive grammaticization like affixation. The differences between the two classifier systems is in full accord with the model that we presented in our earlier work on ISL and ASL, which emphasizes the competing forces of communicability, modality specific iconicity, and individual language-specific grammaticization in the growth of each language.

We hope that the reader will conclude as we have that it is possible to understand much of the morphological structure of sign languages in terms of the interplay among three factors: (1) the capacity for combining linguistically significant partials into unified complex structures; (2) language modality; and (3) language age. All sign languages share certain striking similarities in their morphological structure (and differences from spoken languages) that are grounded in the spatial modality of sign. This modality permits sign languages to easily represent spatial structure, relations, and events isomorphically and iconically.

In our earlier work (Aronoff et al., 2000), we showed the effect of modality on agreement, and in our current work we have extended the scope of our observation about spatial isomorphism and iconicity to what have come to be called *classifiers*. With age, though, sign languages change. Researchers have known for a long time that individual signs can become less iconic and more arbitrary, making sign languages more like spoken languages in that regard (Frischberg, 1975). As summarized in the section beginning on page 57 (*Sequential Affixation in Sign Languages*), we showed how sign languages develop idiosyncratic arbitrary affixational morphology through time, which, like arbitrary lexical signs, makes them more like spoken languages. Turning to classifier constructions, we have found that the effect of age is subtly different. Yes, we find lexicalization of individual signs out of classifier constructions, which is sometimes dramatically swift as with the ISL word, LIGAMENT. But what is newly discovered is how the entire system of classifier constructions can show more arbitrary and grammaticized forms, as in ASL versus ISL. Still, the users of any sign language never lose touch with the system's iconic roots, and are consequently able to return to these roots for conversational eloquence or performative effect.

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ENDNOTES

[1]Authors' names are listed in alphabetical order.

[2] Packard (2000), in the most recent survey of Mandarin morphology, lists five inflectional suffixes and one prefix, along with seven derivational prefixes and eight suffixes.

[3] We assume here the HT model proposed in Sandler (1989). Other models that involve sequentiality but that differ from this one and from one another in important ways are those of Liddell (1984) and its successor, Liddell and Johnson (1989), both of which influenced the HT model; Perlmutter (1992); van der Hulst (1993); and Brentari (1998).

[4] Reduplication is not viewed as sequential, because it does not affix new material but merely repeats the inflected base.

[5] Very interesting evidence supporting the naturalness of simultaneous encoding of particular kinds of linguistic information in sign languages was presented by S. Supalla (1991). Supalla studied the language of deaf children exposed only to Manually Coded English, an artificial manual language that represents the derivational and inflectional morphemes of English in a linear sequence. Supalla found that the children spontaneously produce simultaneous modifications of verbs to mark verb arguments, although they have had no exposure to real sign languages.

[6] ASL, Swedish SL (Brita Bergman, p.c.), British SL (Brennan, 1990), and Japanese SL (Soya Mori, p.c.) apparently also have complex forms in which the first member is related to the senses. Preliminary inquiries indicate that there are differences across languages in terms of productivity, part of speech, and meaning, differences that are important in the context of our model. (See footnote 7.) More research is needed to determine whether or not the forms in these languages are also prefixes and how they pattern in their respective languages.

[7] Ordinary indexical pronouns in ISL also cliticize onto hosts in two different ways, depending on the prosodic strength of their position in a phrase (Sandler, 1999a, 1999b).

[8] We wish to exphasize that the dichotomy presented in this table should be understood as representing general tendencies, and not absolute binary oppositions.

[9] The fact that several sign languages apparently recruit signs involving the senses to create complex words with sequential structure is not incompatible with the generalization that sequential morphological processes are sign language specific and not sign-language universal. Increasing vocabulary by grammaticizing sense terms as affixes also occurs in spoken languages (Sweetser, 1990). The correct prediction, then, is that the particular ways in which sense terms are grammaticized should be different across sign languages. As indicated in note 6, we have reason to believe that this prediction is borne out.

[10] Fischer (1979) makes a similar point at the lexical level, arguing that spoken languages do not have as many iconic words as sign languages because sounds are less apt to represent things in the real world in a direct manner.

[11] Early researchers to use this term are Frishberg (1975) and Kegel and Wilbur (1976), and McDonald (1982).

[12] Senft (2000b) refers to this type as classificatory noun incorporation, a view that is compatible with the influential theory developed in Mithun (1984, 1986). See also Meir (1999) for a treatment of some types of classifiers in ISL as noun incorporation.

[13] We refer here to the SASS classifiers that involve a static handshape which combines with movement and location morphemes, and exclude from our discussion the dynamic Size and Shape Specifiers (Klima & Bellugi, 1979), whose behavior is different.

[14] McDonald (1982) demonstrates that Navaho encodes grammatically some of the same classificatory concepts that are encoded in ASL. Our point is that the morphological means for doing so is not comparable.

[15]In the Klima and Bellugi (1979) description of SASSes, only those that involve tracing the outline of the referent type (e.g., RECTANGULAR-OBJECT) were included. Following T. Supalla (1982), we include as SASSes also those handshape classifiers that indicate size and shape, such as LONG-THIN-OBJECT, FLAT OBJECT, etc. These have no tracing or other inherent movement, but rather

combine with movement and location formatives for form classifier constructions. The tracing type may constitute a SASS subset; they have movement of their own and are more likely to enter into compound constructions than are the non-tracing handshape size-and-shape specifiers.

[16] The analysis of classifier constructions in Meir (2001) lends further support to our hypothesis about the relation between spatiotemporal categories and complex simultaneous morphology in sign languages. In that analysis, Meir argues that the thematic roles and conceptual categories of classifier constructions are directly linked to and iconically represent positions on the spatial thematic tier of lexical conceptual structure (Jackendoff, 1987, 1990).

[17] This movement may be complex, consisting of both a path movement and a handshape or orientation change, but in order to count as a single syllable, the two types of movement must occur simultaneously.

[18]As Brentari (1998) pointed out, there are signs in which h2 has the same handshape as h1, but h2 does not move. Under identity ,h2 may have a marked shape in such signs. We suggest, therefore, that the Dominance Condition be revised as follows: (2') Revised Dominance Condition. In signs in which h2 is passive (i.e., does not move), h2 may not be specified for a marked handshape, except redundantly, by copying the shape of h1.

[19] There are vanishingly few examples of monomorphemic words of more than one syllable apart from reduplications (see Brentari, 1998).

[20] *Prosodic words* (also called phonological words) refer to what might intuitively be considered the smallest unit that can be uttered by itself or, alternatively, the domain within which word level stress is assigned. This constituent might include more than a morphosyntactic word. See, e.g., Selkirk (1984), Nespor and Vogel (1986), and for sign language, Brentari (1998), and Sandler (1999a, 1999b).

[21] See Sandler (1995, 1996b) and van der Kooij (2001) for treatments of markedness in handshapes.

[22] Apparently, Battison' Symmetry Condition does hold on classifiers in Indo-Pakistani Sign Language (IPSL, Zeshan, chap. 6, this volume). If modern IPSL is descended from the language used in the first school for the deaf established in Bombay in 1886 (U. Zeshan, personal communication), then one might speculate that this is an example of the diachronic imposition of grammatical constraints on the relatively iconic classifier system in this language. The Symmetry Condition, while phonetically grounded (see van Gijn, Kita, & van der Hulst, 2000), is not physiologically required, as we see in the ASL example, Fig. 3.8. This means that it is grammatical in some sense. In addition, this constraint is not expected on purely semantic grounds, as we have explained. Thus, it might be the case that grammatical constraints active in the lexicon are imposed on classifier constructions, and that language age is a factor. We note, however, that it is certain that ASL dates back just as far, and yet the Symmetry Condition does not hold on its classifiers. So, even if the constraint in IPSL is a diachronically evolved restriction, this restriction on classifier constructions should not be considered inevitable.

[23] On the relation between prosody, syntax, and semantics in spoken language, see, e.g., Selkirk (1984), Gussenhoven (1984), Nespor and Vogel (1986), and Ladd (1994).

[24] Rosenstein (2001) argued that topics in ISL are not moved, i.e., not topicalized, but originate in topic position. This does not affect our discussion, however, as there is evidence from topic prominent spoken languages that base generated topics also form independent intonational phrases (e.g., Aissen, 1992).

[25] The more neutral term, *superarticulation*, is adopted in Sandler, 1999b, instead of the voice-specific term, *intonation*.

[26] A more accurate gloss might be 'FLAT-OBJECT-MOVE-ALONG-PATH'.

[27] Kegl et al. (1999) included motion and location verbs among the set of inflecting verbs, whereas we considered only the transfer (true agreement) verbs (Aronoff et al., 2000). For us, motion and location verbs fall into the classifier category. Kegl et al. found clear differences between the two predicate types among older group of signers, who used more motion and location than they did verb agreement.

[28] Some linguists believe that creole language emerges abruptly in children who have only pidgin input (see, e.g., Bickerton, 1984; Thomason & Kauffman,1988). Other linguists are committed to the idea that creolization is a more gradual process that also allows an important role for adults and interaction between their native language and the superstrate language (e.g., Carden & Stewart, 1988; Lumsden, 1999). Abrupt leaps in the course of diachronic change within an existing language, in creolization, or in ordinary lan-

guage acquisition, have been characterized as *catastrophic language change* (e.g., Lightfoot, 1979, 1999). Sankoff (1979) used the term 'catastrophic', but with a crucial difference. She uses it not for the process of creolization itself, but for its cause, claiming that pidgins and creoles arise as a result of a catastrophic break in linguistic tradition.

[29] We are following T. Supalla (1982) here. Our entity classifiers correspond to his semantic classifiers, and our SASSes are the same as his.

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Commentary

4

Classifiers in Spoken and in Signed Languages: How to Know More

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Almost all languages have some grammatical means for the linguistic categorization of noun referents. 'Classifiers' is an umbrella label for the continuum of noun categorization devices, from lexical numeral classifiers of South-East Asia to highly grammaticalized gender agreement classes of Indo-European languages. They provide a unique insight into how the world is categorized through language in terms of universal semantic parameters involving humanness, animacy, gender, shape, form, consistency, orientation in space and functional properties of entities.

Classifiers are overt morphemes that constitute a grammatical system and serve to arrange nominal referents into semantically defined classes. A language has classifiers if it possesses *Classifier Constructions*. These are understood as separate grammatical units—such as noun phrases, verb phrases, or clauses—which require classifiers, chosen according to the semantics of a noun.

Classifiers in spoken languages come in different guises. *Noun classes*, or *genders* (as in Spanish) are highly grammaticalized agreement classes based on such core characteristics of noun referents as animacy, sex, humanness and sometimes also shape. In some languages, most nouns are assigned to just one noun class; in other languages different noun classes can be chosen to highlight a particular property of a referent.

Noun classifiers categorize the noun with which they cooccur and are independent of any other element in a noun phrase, or in a clause (Craig, 1992). They are often independent words with genetic semantics; thus, in Yidiny, an Australian language, "one would not generally say… 'the girl dug up the yam', …it is more felicitous to include generics and say 'the person girl dug up the vegetable yam'" (Dixon, 1982, p. 185). The choice of a noun classifier is predominantly semantic, based on social status, function, and nature, and also on physical properties, such as shape. Noun classifiers should be distinguished from derivational components in class nouns,

such as berry in English *strawberry*, *blackberry*, etc. with their limited productivity, high degree of lexicalization, and the fact that they are restricted to a closed subclass of noun roots.

Numeral classifiers appear next to a numeral, or to a quantifier; they categorize the referent of a noun in terms of its animacy, shape, and other inherent properties. In possessive constructions, *Relational classifiers* categorize the ways in which noun referents can be manipulated by the possessor—whether they are to be eaten, drunk, worn, etc.; whereas possessed classifiers categorize the *Possessed Noun* and the extremely uncommon *Possessor classifiers* reflect the semantic properties of the possessor. Other rare classifier types are *Locative classifiers*—found in some South American Indian languages—which occur on a preposition, and *Deictic classifiers*—found in North American Siouan and South American Guaicuruan languages—which are tied to demonstratives and involve shape and orientation as semantic parameters.

Verbal classifiers can be affixes on the verb, categorizing the referent of a nominal argument, which is typically in S (intransitive subject) or O (direct object) function, in terms of its animacy, shape, size, structure, and position. Or they may be fused with a verb forming *Suppletive* (*or partly analyzable*) *Classificatory verbs.* They are found in some North-American Indian languages (such as Athabascan), some North-Australian languages, some Papuan languages and some South-American Indian languages. Different verbal stems are used for handling, existence and location of round things, long things, granular things, things in bags, etc. Alternatively, different classificatory verbs categorize the intransitive subject argument in terms of its orientation or stance in space, and also to its inherent properties. In Enga, a Papuan language, a verb meaning 'stand' is used with referents judged to be tall, large, strong, powerful, standing or supporting, e.g. men, houses, trees; 'sit' is used with referents judged to be small, squat, horizontal and weak, e.g., women, possums, and ponds. For an overview of classifier types in spoken languages see chapters 2 to 7 of Aikhenvald (2000).

The main argument in favor of the proposed typology lies in the possibility of one language having more than one classifier type: for instance, numerous Mayan languages have noun classifiers and numeral classifiers. Languages can use the same set of morphemes as numeral classifiers and as noun classifiers—one such example is Hmong (Miao-Yao, from China). See chapters 8 and 9 of Aikhenvald (2000).

Of all classifier types, only noun classes involve agreement. Different types of classifier differ in their preferred semantic parameters; animacy and humanness are predominant in noun classes, whereas noun classifiers often categorize referents in terms of their function and social status. Numeral classifiers typically categorize referents by shape, e.g., round or vertical, whereas verbal classifiers may also involve orientation—vertical or horizontal. Semantic parameters employed in classifier systems are not random. If a language has classifiers for three-dimensional objects, it will also have classifiers for two-dimensional ones. There are certain recurrent patterns by which nouns become classifiers; these include changes from 'head' to 'round object', from 'eye' to 'small round object', from 'leg' to 'vertical object', and from 'leaf' to 'flat object'.

Functionally, classifiers involve identifying properties of referents and categorizing them by these properties. A classifier of any type can categorize a whole class of referents, or just a member of a class; or a member of a class when it is playing a particular role in the context. Classifiers frequently highlight particular properties of a referent. For instance, in Burmese, a river can be viewed as a place, as a line (on a map), as a section, as a sacred object, or as one connection. These meanings are distinguished through the use of different numeral classifiers. In Apache, a plug, a box, a stick, or a bag of tobacco are distinguished through the use of different classifica-

tory verbs. All classifiers are used anaphorically, that is, as proforms, for tracking referents in discourse (see chaps. 10 to 14 of Aikhenvald 2000).

The only kind of classifiers reported thus far for sign languages are classificatory verbs of handling, motion, and location. These appear to be found in every sign language. Note that in spoken languages they are restricted to highly polysynthetic languages of the Americas, Australia and Papua New Guinea.

A feminine/masculine distinction in pronouns is found in Japanese Sign Language; Taiwanese Sign Language distinguishes the two genders in argument marking on auxiliary verbs.

Similarly to spoken languages, classificatory verbs in sign languages belong to semantic groups of handling, location and motion. In sign languages, they operate with a more fine-grained set of shapes and magnitude than they do in spoken languages. They typically identify referents by their orientation in space, and by number; this is less common in spoken languages.

Shape and size specifiers are semantically similar to classifiers in spoken languages. However, they appear to be a subclass of modifiers also employed as descriptive predicates, and do not seem to form a classifier construction of their own.

Many questions remain unanswered at the present stage of research on classifiers in sign languages. Do classificatory verbs in sign languages "categorize" the referents of their arguments? How like—and how unlike—classificatory verbs in spoken languages are they? How do classifiers in sign languages get grammaticalized and what semantic changes take place? Note that in spoken languages classifiers of most types come from nouns. At least in Thai Sign Language, classifiers "appear to be historically related to spatial-locative predicates" (Collins-Ahlgren, 1990, p. 115).

Answering these—and many more—questions, requires investigating the following issues, based on the material of sign languages from different parts of the world:

1. What are the definitional properties of classifier constructions?
2. What are the inventories of classifier morphemes, e.g., classifier handshapes, and the semantic parameters employed? In which ways are they different from those of spoken languages? What semantic extensions are natural for sign languages? Can classifier categories be semantically complex?
3. What are the functions of classifiers? Are they used to categorize noun referents as members of conceptually distinct classes of entities? (Note that the intuition of native speakers is crucial here). How does the use of classifiers correlate with discourse-pragmatic properties of noun referents—such as their topicality—and with their syntactic function?

An in-depth study of classifier constructions in sign languages in terms of these parameters will shed light on their nature and development, and may involve significant modification to the focal points for the typology of classifiers proposed on the basis of spoken languages.

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5

Classifier Systems in the Context of a Typology of Nominal Classification

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This chapter presents elements of the most recent typological work on nominal classification systems of oral languages published by the author (Grinevald 1999, 2000, 2002, in press), the choice of these elements being based on their perceived potential relevance to the analysis of the so-called classifier systems of signed languages. The chapter opens with a brief discussion of some of the principles that guide the ongoing elaboration of this typology, partly in order to articulate in what ways it might diverge somewhat from writings on the same topic by Aikhenvald (2000, chap. 4). The chapter closes with a consideration of what kind of data from signed languages could facilitate a more systematic comparison of the phonemenon of nominal classification in oral and visual gestual languages.

GUIDING PRINCIPLES OF THE PRESENT TYPOLOGY

The typology to be presented here follows two guiding principles. The first is an a priori position, which was originally taken to deal with the specific challenge of linguistic description posed by nominal classification systems of the Amazonian region, but is also expected to be useful for a comparative description of the manifestation of nominal classification in signed languages. The second is the embracing of a particular theoretical framework, with all its descriptive implications.

The a priori is the choice made not to lump (almost) all instances of nominal classification systems under the same label of *classifiers*, in the interest of confronting head-on the diversity of such systems, while still acknowledging their possible partial overlaps. The effort therefore will tend specifically toward teasing apart various types of systems, to be identified by specific terminology, and characterized through their most prototypical exemplars. This will mean separat-

ing at first the more lexical systems from the more morphosyntactic ones, as well as the most grammaticalized ones, in order to establish classifier systems as intermediate lexicogrammatical systems distinct from both. In this approach, the expression, *nominal classification systems*, is the cover term for all the systems that appear to organize nominal elements of a language into some morphologically marked classification, whether it be within the lexicon or as part of the morphosyntax of the language, while the term, classifiers, is reserved for a particular subset of those systems. Using the term, classifiers, in a more generic way for a greater variety of systems of nominal classification only begs the question of finding other terms to deal with subsystems that can obviously be regrouped in a distinct type. It could also contribute to maintain a certain level of unnecessary uncertainty for those who are little familiar with the phenomenon, by obliterating the recognition that some systems share more characteristics than others, in particular the classifier systems proper among themselves.

In fact, these classifier systems present challenges of their own, such as the existence of different subtypes. There are, for instance, distinct systems of numeral, nominal, genitival and verbal classifiers, all well established by now, although their distinctive characteristics are still often not taken seriously enough into account in the discussion of the phenomenon. In this context, using the term, classifier, as a more general term might not help account for the specificities of those different subsystems (according to a linguist who has spent much ink claiming, e.g., the existence of a so-called noun classifier system, distinct from the much better known numeral classifier systems, to apparently no avail in that both systems continue to be lumped together in numerous discussions, in spite of arguments presented as to their distinct semantics and morphosyntax). Another reason to maintain the term,classifiers, for a particular type of nominal classification system is the pending issue of the exact number and nature of their subtypes.

The basic need for more extensive fieldwork on all systems of nominal classification, including classifier systems per se, is in fact the main motivation for taking this a priori "nonlumping" position. The concern is indeed to facilitate as much as possible the systematic collecting of new data, including that of field linguists not specialists in the phenomenon, and the subsequent analysis of this data in a manner that will permit more comparative work. With this goal in mind, the recommendation is to proceed in two steps: the first one consists in identifying those systems that are less problematic to analyze within the present state of knowledge of this phenomenon, systems that correspond to clearly recognizable types of subsystems. After this first screening, the second step consists in the more challenging task of dealing with more complex systems of apparently mixed nature in order to analyze the kind of blending they seem to exhibit.

Beyond the nonlumping position just articulated, the second guiding principle is to cast the typology within a functional–typological approach, and to claim that such a framework is particularly apt at handling the kind of descriptive challenge data from apparently more complex systems, in particular systems considered as mixed systems with partial overlaps across various types of systems. Essential to the functional–typological approach, as it was originally articulated, for instance, by Givón (1979, 2001), is an approach to linguistic categorization that appeals to the notion of prototype and applies it beyond the lexical domain to that of morphosyntactic and syntactic domains. In this approach, one can assume that nominal classification systems can be more or less prototypical too, or more or less at the fuzzy edges of categories or types, possibly overlapping partially over two distinct types. Espousing this functional–typological approach also means giving constant attention to the

dynamic nature of linguistic systems, in particular that of the morphosyntactic ones, always raising the issue of their level of grammaticalization, and taking into account as well their age and their particular stage of evolution. Keeping track therefore of the existence of a variety of subsystems, as well as of the specific dynamics of the systems of a particular language, provides a productive way of handling the sometimes almost overwhelming variability of nominal classification systems.

The guiding principles of this typology of nominal classification systems are therefore in great part strategic, keeping in view all the fieldwork that remains to be done on languages with such systems, many of which are indigenous languages still little described (and not surprisingly in the now large category of endangered languages). They would seem to be applicable as well to developing work on the phenomenon in signed languages.

OVERVIEW OF A TYPOLOGY OF NOMINAL CLASSIFICATION SYSTEMS

This typology is basically a morphosyntactic typology that considers the variety of systems on a lexical–grammatical continuum, and that identifies the particular type labeled classifiers as a set of intermediate lexicogrammatical systems (more precisely lexicomorphosyntactic systems), as sketched below:

(1) Overview of systems

<Lexical.....	**Lexicogrammatical.....**	**grammatical...>**
class-terms	"CLASSIFIERS"	noun classes
measure terms		gender

The particular type of nominal classification system identified as classifiers is itself constituted by a set of classifier systems identified by their respective morphosyntactic locus. The major systems discussed in the general literature on classifiers of spoken languages are the following:

(2) Major classifier systems

[POSS+	**CL** Numeral+	**CL**	**CL**+NOUN // Verb-	**CL**
	Genitive	***numeral***	***noun***	***verbal***
	Classifier	***classifier***	***classifier***	***classifier***

Three major types are distinguished within the noun phrase: noun classifiers, with the noun directly; numeral classifiers, in quantitative constructions; genitive classifiers , in possessive constructions. Numeral classifiers can also appear secondarily on adjectives and demonstratives. Another major type of classifiers is found inside the verb form—hence its label of *verbal classifiers*—from where they classify the nominal arguments of the verb on a semantic basis similar to that of the classifier types found within the noun phrase. Prototypical exemplars of systems would be the ones with the characteristics that most clearly distinguish them from other systems (i.e., with the least amount of features overlapping with that of another system).

The following examples illustrate each subtype of classifier system with such prototypical examples:

(3) a. Noun classifiers; JAKALTEK (Craig 1986a, p. 264)
xil naj xuwan no7 lab'a
saw CL John CL snake
'(man) John saw the (animal) snake'

b. Numeral classifiers; PONAPEAN (Rehg, 1981, p. 130)

Pwihk	riemen	'two pigs'
Pig	2+CL:animate	
Tuhke	rioapwoat	'two trees'
Tree	2+CL:long	

c. Genitive classifiers; PONAPEAN (Rehg, 1981, p. 184)

Kene-i	mwenge	'my(edible) food'
CL-GEN.1	food	
Were-i	pwoht	'my(transport) boat'
CL-GEN.1	boat	

d. Verbal Classifiers; CAYUGA (Mithun, 1986, p. 386–388)

Ohon'atatke:	ak-hon'at-a:k	
It-potato-rotten	past.I-CL-eat	'I (potato)ate a rotten potato'
So:wa:s	akh-nahskw-ae'	
Dog	I-CL-have	'I (domestic.animal)have a dog'

The two major arguments that have been presented in support of the existence of different subtypes of classifiers in Craig (1992) and Grinevald (2000) are the possible co-occurrence of systems within the same language and the different semantic profiles of the distinct classifier types (which are assumed to correspond to different functions of those systems, a potential third argument that remains to be fully developed).

What follows is a presentation of the major four parameters on which the typology is constructed: the first three have been discussed in more or less explicit ways in the literature and consist in identifying: (a) the loci of the classificatory elements; (b) the semantics involved in those systems; and (c) the function and use of such systems. The fourth parameter is the multidimensional approach already mentioned, which combines the various dynamic aspects of those systems. All four parameters will be taken up in turn.

LOCI OF CLASSIFICATORY ELEMENTS.

This approach to the study of classification systems is a distributional one that takes into account the loci of the classificatory elements and is in fact implicit behind the terminology most widely used. It is the one most accessible for the initial description of nominal classification systems of little known or undocumented languages, to the extent that basic morphology is the most accessible aspect of those languages for field-workers.

As it turns out, classificatory elements may be found in many loci of the clause, but seem to fall within two major groups: those forming patterns of local agreement within the noun phrase and those forming a long-distance concord system between nominal and verbal elements, as sketched in (1a and 1b) above.

A morphosyntactic approach to the overall diversity of nominal classification systems consists in distinguishing types of systems basically by the number and the nature of the loci of the classificatory elements (marked as CE below):

(4) a. [N + CE det+CE adj+CE num+CE poss+CE [X+CE]]
b. [V+CE]

Such an approach would identify at least the following patterns of nominal classification systems:

(5) a. N-CE
b. num+CE (dem+CE)
c. poss+CE
d. verb+CE
e. [N+CE X+CE Y+CE Z+CE]

The structural patterns outlined in (5a to 5e) correspond to the following types of nominal classification systems:

a. There are in fact two distinct systems subsumed under this basic pattern of a classificatory element accompanying a noun directly. One is a system of a lexical nature (compounding or derivation) creating new lexical items, and to be labeled here *class terms*. An example from English is the case of the *-berry* compounding element of *strawberry*, *blueberry*, or *boysenberry* . The other is a system of a morphosyntactic nature, in which the classifiying element accompanies the noun while remaining its own entity. It corresponds to one of the classifier subsystems, labeled here *noun classifier* (see Craig, 1987, for the description of such a system in a Mayan language). The two types of CE are sometimes confused to the effect that class terms are called classifiers in numerous language descriptions.

b. This pattern corresponds to the instances of classificatory elements encountered in quantifying constructions, and labeled *numeral classifier systems* on the basis of their use on a numeral (or a quantifier in some languages). In some languages, the same classificatory elements are also used in demonstratives and adjectives. Numeral classifiers constitute the best known type of classifiers; they are common among South East and East Asian languages.

c. This is the pattern found in possessive constructions, and known variously as *possessive classifiers* or *genitival classifiers*, or *relational classifiers*. There may be several subtypes of those, depending on which of the two nominal elements of the possessive construction is being classified, as clarified by Aikhenvald (2000). They are, for instance, a characteristic of the Micronesian languages (see Carlson & Payne, 1989, for an overview of this type).

d. This pattern shows classificatory elements on the verb form that are considered in oral languages to be in some concordial relation with an external nominal argument of the verb. These so-called *verbal classifiers* have been described for some North American Indian languages, although not always with a clear distinction between lexical classificatory verbs and actual segmentable verbal classifiers. It is worth noting here, in the context of a discussion of classifiers in signed languages, that the situation of Navajo, one of the languages most commonly brought into focus for comparison with signed language classifiers, falls in the domain of classificatory verbs rather than strictly speaking verbal classifiers.

e. In this pattern the classificatory elements are typically repeated on several elements of the clause. It corresponds to the systems generally labeled *noun class systems*, of which the Bantu systems represent the most prototypical cases. Although these systems are generally used in the general linguistic literature as instances of extensive and relatively regular agreement patterns, the reality of the varied spoken, and nonnormalized languages of this large family of languages includes a great variety of systems, with many that are much less extensive in their agreement patterns, more selective in the loci, and variable both as to the morphological nature of the marks and as to the obligatoriness of their use (Grinevald & Creissels, 2000). In their extensive agreement pattern, these systems are akin to the gender systems of Indo-European languages.

One approach to capturing the great variety of nominal classification systems has therefore been to label them by their principal loci, distinguishing between those that are essentially one-locus systems, such as the lexical system of *class terms* and the morphosyntactic systems of *classifiers*, and those that are multiple-loci systems with more or less extensive and complex agreement patterns, such as the ones traditionally labeled *noun class systems.*

SEMANTICS

One of the interesting aspects of most of these nominal classification systems is their semantic motivation. Unlike gender systems with limited number of classes and extensive desemanticization of the classes (why are forks and plates feminine in French—*une fourchette* , *une assiette* —but masculine in Spanish—*un tenedor*, *un plato*—for instance?), most other systems are characterized by more retrievable semantic motivation, as well as much larger number of classes.

There have been at least three major proposals, dating from the 1970s and classics of the field by now, which have attempted to capture the universal semantic properties of nominal classification systems. They are Adams and Conklin (1973), Denny (1976), Allan (1977); being written in the seventies when the issue was not being raised, they all had a tendency to overlook the existence of different types of systems. The impact of those articles has therefore also contributed to the lingering tendency to lump systems under the label of classifiers. Denny (1976) offered the elegant proposal of distinguishing between semantic traits of what he called "social, physical, and functional interaction" (p. 125). In the social interaction realm fall the animate entities of our world, principally fellow human beings, classified by gender, social rank, or other categorization schema, as well as other entities such as divinities and other powers specific to a culture. In the physical interaction realm, objects of the world are classified along certain parameters linked to their nature as manipulable and manipulated objects, principally the parameter of shape.

The semantic trait of shape, which is of particular interest for signed languages, has been the object of great attention in the study of classifiers of spoken languages. Allan (1977) detailed some of the same semantic traits as Denny (1976), noting in particular the primacy of three basic shapes, themselves semantically combinations of one of the major dimensional outlines of objects (1D, 2D, 3D) with a secondary characteristic of consistency and/or size. As noted earlier by Adams and Conklin (1973), the three basic shape classes found in (numeral) classifier systems of Asian languages are the following:

(6) universal semantics of shape classifiers:
one dimensional 1D, as long and rigid;
two-dimensional 2D, as flat and flexible;
three-dimensional 3D, as round.

Further discrimination of texture and size of objects are said to intervene in larger systems (e.g., such as grainlike, i.e., small round, or pointed, long, and rigid).

To be noted is the particular lexical origin of many classifiers of shape, which links the most common classifiers to nominals of the vegetal domain, in the following pairs (Adams, 1986; Adams & Conklin, 1973):

(7) Basic set of shape classifiers and their origins

CLASSIFIERS	LEXICAL ORIGIN
1D: long-rigid	tree/trunk
2D: flat	flexible leaf
3D: round	fruit

Denny's (1976) third semantic regrouping are the classifiers that fall in the functional interaction realm, where entities of the world are classified by the use to which they are put, such as items of clothing, hunting or fishing, transportation, etc. It is actually often difficult to say whether the semantics of a classifier correspond to strictly physical characteristics of shape or to one of function, because certain shapes naturally lend themselves to certain functions. For instance, are objects hollowed or made to be concave to be considered for their shape, as round hollow objects, or for their function, as recipients and containers?

The above discussion of the semantics of shape in classifiers needs to be placed in its proper context; as will be said again and is often ignored in the discussion of semantics of classifiers, shape is typical of numeral classifier systems, and some subtype of verbal classifiers in spoken languages (if one maintains the constraint of classifiers being segmentable morphemes, excluding the case of lexically classificatory verbs). The above discussion of shape classifiers was also restricted to the so-called "sortal classifiers" (identifiable as a rule of thumb for speakers of Indo-European languages as those classifiers whose semantics appear to be redundant with respect to the semantics of nouns); why speak of "round" oranges, "long rigid" arrows, or "flat flexible" blankets?). Sortal classifiers are to be distinguished from "mensural" classifiers, which are akin to the elements of mensurative constructions found in all languages of the world and that include measure expressions (a "handful" of books, a "crowd" of people, a "gallon" of milk) and configurations (a "pile" of books, a "line/circle" of people, a "puddle" of milk). These mensural classifiers may come in great numbers in numeral classifier systems, whereas the set of sortal classifiers that attend to the material or the shape or the function of individual objects is usually small. For instance, of the hundreds of Tzotzil numeral classifiers, only seven are actually sortal classifiers (deLeón, 1988).

Although the semantics of shape and function have been emphasized here, because of their relevance to the classificatory systems encountered in sign languages, it is worth noting that some systems function on the semantic basis of the material essence of the objects classified (animal, vegetable, mineral). In fact, exploratory work points to a certain alignment between types of semantics (shape vs. function vs. material) and morphosyntactic types of classification systems, at least among classifier systems, as discussed in Grinevald (2000). Shape seems to be the

dominant semantic parameter in numeral classifier systems, whereas function is the major semantic parameter of genitival classifier systems, and material the major one of noun classifier systems, opening up the question of why such an alignment.

Besides varying as to the semantics of their individual classifying elements, systems of nominal classification vary also greatly as to the number and specificity of the classes they form.

Within the literature, one finds different labels for classifiers that head from very simple to very complex classes, i.e., from homogeneous classes, with transparent semantic motivation to very heterogeneous classes, which are usually considered as made of a core set of prototype elements to which others have been added through various means of extension. The most notorious example in the literature of a system with heterogeneous classes is probably that of the system of Dyirbal (actually not a classifier system per se but rather a noun class one, originally described by Dixon [1972, 1982] used by Lakoff [1986,1987]), together with the case of the Japanese numeral classifier *hon*, for an exercise in motivating the heterogeneity of some classes.

One talks, for instance, of specific, general, unique and repeater classifiers. *Specific classifiers* are the most common type. The classes they head are built around prototypical exemplars, with incorporation of other elements by any number of types of extensions of the class. *General classifiers*, as their label indicates, are largely desemanticized and head large heterogeneous classes with no distinct semantic motivation; whereas *unique classifiers*, at the opposite end, head classes of just one element. The term *repeaters*, on the other hand, refers to classifiers that are copies of nouns, whether they function as unique or specific classifiers. Large Asian numeral classifier systems are known to have general classifiers, pseudoequivalent to the cover words *truc*, *machin*, of French or *thing* of English. The distinction between unique and repeater is not often made clear in descriptions, although examples from the noun classifier system of Jakaltek-Popti' can illustrate the concepts (Craig, 1986).

(8)

Type of classifier	*CL*	Class members
"specific"	no'	ALL animals, except dog, All products of animals (Egg, milk, leather shoes, wool blankets, etc.
"unique"	metx'	ONLY *metx' tx' i* 'dog'
"repeater"	tx'otx'	*Tx'otx' tx'otx'* 'dirt, ground' AND all objects made of clay (*tx'otx' xih* 'pottery jog' etc…

Although the examples of Jakaltek-Popti' come from a noun classifier system, the mixture of more or less specific classifiers is particularly prevalent in large numeral classifier systems.

FUNCTION AND USE

As mentioned already, the classifying elements function either lexically or morpho-syntactically. In one case, they contribute to the creation of lexical items by compounding or derivation;

in the other, they are part of the morphosyntactic inventory of the language, more or less grammaticalized (i.e., obligatory), in function of determiner or anaphoric element. Some systems are clearly uniquely lexical (the *-berry* element of *strawberry*, *blueberry*, *boysenberry*), and others clearly uniquely morphosyntactic (the noun classifiers of Jakaltek [Craig, 1987], or the numeral classifiers of Tzotzil [deLeón, 1988]).

But the situation is more complex when the same set of classifying elements seems to cover both types of function. This duality has been handled in one of two ways. One is as a characteristic of specifically one kind of system, namely the *noun class system*, on the basis of the ample documentation of its best known exemplars from the Bantu languages. The other is as the co-existence in the same language of two systems of nominal classification, one lexical and one morphosyntactic (as argued by deLancey, 1986 for the coexistence of class terms and numeral classifiers in the languages of the Tai family, as the name of the family is spelled). Much work remains to be done in this area, in order to argue language by language for which the issue arises, whether one is faced with one single complex system of noun classes or two distinct systems of class terms and classifiers, which are diachronically linked.

This challenge is particularly present today for the description of many Amazonian languages with very rich and complex systems of nominal classification, which have been variously labeled as *multiple classifier systems* or as *noun class systems*.

The most common discourse use of classifying elements at an advanced grammaticalization stage is that of being a referent tracking device, to the point of raising the question of whether talking of *classification* is not in fact an unfortunate misnomer. This label of classifiers may reflect more of an ethnocentric approach to the phenomenon on the part of speakers of Indo-European languages fascinated by the mere existence of such systems and what appears to be, from an outsiders point of view, their semantic classificatory functions. Meanwhile, it may well be that the purpose of such linguistic systems is really that of referent identification and referent tracking and that what is talked about as classificatory function is no more than a secondary classifying effect. In particular, the numerous cases of supposedly classifying elements that are full repeaters or simply truncated forms of full nouns would seem to point in that direction.

As for the actual use of the morphosyntactic nominal classification systems (which include the classifier systems proper and the noun class and gender systems), it varies precisely according to their degree of grammaticalization. Both classifiers and noun class systems can be found at various stages of emergence with characteristics of increasing grammaticalization, as well as various stages of decay with increasingly irregular morphology. By definition within this typology, it is a characteristic of prototypical classifier systems to stand at a clear midpoint between lexicon and grammar, in that they are semantically motivated systems of recognizable lexical origin, with morphosyntactic relevance in the language but still within discourse and register sensitive rules of usage.

A MULTIDIMENSIONAL APPROACH

Perhaps the most original contribution of the present typological work on nominal classification systems is the attention given to their inherent dynamics. This multidimensional approach is meant to answer many of the questions raised by the seemingly great variability of the systems, as well as by the existence of overlapping systems in some parts of the world, in particular in languages of Asia and Amazonia where classifier, noun class and class term systems co-occur.

The dynamic dimension that has received most attention is that of the degree of grammaticalization of the different types of systems. The original work in that area has focused on distinguishing between major types of nominal classification systems, principally between noun class systems and classifier systems, originally on the basis of the challenge presented by data of Australian languages. It seemed established early on that noun class systems, which are characteristically concordial systems and that have often been lumped together with gender systems, are essentially more grammaticalized than classifier systems. The parameters for such an analysis are found in the now classic works by Dixon (1982b, 1986) , and a synthesis of subsequent discussions of the parameters of grammaticalization can be found in Grinevald (2000) in the form of a list tailored to address the issue of classifier systems as intermediate lexicogrammatical systems.

Certain cases of overlap of classification systems may be attributed to progressive grammaticalization across systems. Lexical class term systems may give rise to lexico-grammatical classifier systems for instance, and classifier systems may be at the origin of noun class systems, which themselves may reduce to smaller gender systems. Being able to build this grammaticalization cline relies as a matter of fact on the existence of marginal systems with characteristics of two systems at once.

More recent work has been focusing on the grammaticalization dimension within various types of nominal classification systems, comparing, for instance, incipient and fully grammaticalized noun classifier systems (see Grinevald, 2002 with Australian vs. Mayan data, as a response to Wilkins, 2000) , as well as developing vs. fully developed vs. decaying noun class systems (see Grinevald & Creissels, 2000, with Amazonian and Niger-Congo data). Data from Central American Chibchan languages can also show how systems of numeral classification can be apparently as grammaticalized as gender systems, very much in contrast with the more discourse sensitive numeral classifiers of most Asian languages. It probably needs to be specified here that establishing the level of grammaticalization of a system in a descriptive fashion does not make predictions about its future; systems may indeed stabilize at a fairly incipient or developing stage of limited grammaticalization without showing signs of evolving into more grammaticalized ones.

Other dynamic dimensions to be considered are the age and the vitality of the system, as independent from the grammaticalization parameter. There are very old systems, like the Chinese system of numeral classifiers with an extensive historical documentation; and there are much younger systems, like the Kanjobalan-Mayan systems of noun classifiers, which appear to data back to only a few hundred years (Craig, 1990). But age is independent of vitality, as old systems like the Thai system of numeral classifiers can be very open and adaptable to the ever-changing material world of its speakers (Carpenter, 1986), whereas a much younger system like the Jakaltek Kanjobalan noun classifier system appears to have frozen in time some time between colonial times and the 20th century, not absorbing in its classificatory scheme objects of recent import in the culture that are made of material of unknown origin (Craig 1986b).

A real spread of the noun classifier system is also an important variable to consider, as such systems are easily borrowed. Interestingly enough, the borrowing may be a purely linguistic one, when the system with its morphemes and even the writing system in which it is cast are borrowed (as is the case with the Japanese numeral classifier system of Chinese origin), or it may consist of the borrowing of the idea of a classifier system, reconstituted with native morphological material. This seems to be the case of the spread of the noun classifier system in the Cuchumatanes area of Guatamala, for instance, from the Kanjobalan languages to the neighboring languages of the Mamean branch of the family (Craig, 1990).

NOMINAL CLASSIFICATION SYSTEMS AND SIGNED LANGUAGES

The following notes, comments, and suggestions about the nominal classification systems of signed languages admittedly come from an outsider to the field of signed language study and stem from a desire to see the kind of data from those languages that could facilitate a more systematic comparison between systems of nominal classification of languages of both oral and visual–gestual modalities. The essential issue of the nature of the denomination of objects in those languages is considered first, including the variations in the strategies used for the denomination of objects in isolation and in discourse context. All along, the points raised in the presentation of the typology of nominal classification systems are taken up again, such as the loci of the classificatory elements, their semantics, and their function and use. Suggestions as to the type of data that would facilitate a closer comparison of the manifestations of the general phenomenon of nominal classification systems across both language modalities are given in closing.

Although the nature of the morphology of the classifying elements of signed languages is in itself a topic of great interest in the study of nominal classification systems, it stands outside of the scope of the present considerations on the study of classifiers (classifiers per se and other classification systems as argued here). What will be retained here about this morphology is the difference between oral and visual–gestual languages in terms of the degree of arbitrariness of their signs; the signs of oral languages being by definition arbitrary signs as far as the phonological composition of their lexical roots is concerned (with the rare exception of onomatopeic words), and those of visual gestural languages being more fundamentally iconic, at least at their origin (see Taub, 2001 for a discussion of ASL iconicity). This fact creates an essential difference in the lexical composition of those languages, and, for what is of most concern here, in the process of the denomination of the most common objects of the world, the ones with which humans surround themselves and the ones that are most readily included in the classificatory schemes of the nominal classification systems of oral languages.

As a general rule in the majority of oral languages, the denomination of movable and manipulable objects of the world consists in basic lexical roots with no explicit indication of perceptual aspects of those objects, in particular, of their shape. For instance, there is no hint of the shape of the following objects in their name in either English, French or Spanish:

(9)

English	French	Spanish
knife	couteau	cuchillo
glass	verre	vaso
apple	pomme	manzana
dog	chien	perro

The phenomenon of class terms, in those oral languages with such a system, however, introduces morphological elements with some semantic motivation in the denomination of certain objects. Class terms, which are added to arbitrary lexical roots and are themselves arbitrary lexical material, nevertheless generally introduce in the denomination of objects semantic elements that evoke some visual aspect of the objects. Although in English, the phenomenon is quite limited (e.g., recall the examples of the words for -berries mentioned earlier), in some languages,

such as some Amerindian languages, it may be more extensive. In such cases it is common to see the phenomenon labeled as a system of classifiers, although by the working definitions of the present typology, strictly speaking, they are not.

Here it is worth noting again how those class terms can be shown to be secondary morphological systems that have originated in some primary lexical stock, hence arbitrary linguistic material in essence. However, to the extent that they appeal partly to the shape of the objects they help name, these class terms can indeed be argued to introduce a measure of semantic motivation in the denomination of certain objects in oral languages.

There is therefore, in those oral languages that have them, a progression from the complete arbitrariness of the lexical noun root to the partial appeal to information on visual aspects of objects through the use of either class terms or numeral classifiers. The situation with these classifying elements is then one of partial arbitrariness of the lexical material from which they originate (e.g., as in the classifying element LONG.RIGID coming from the lexical item for tree), combined with the evoked imagery conveyed by the semantics of the classifying element (that of a long.rigid object for instance).

In visuogestural languages, the process of denomination of objects exhibits a much greater measure of iconicity, reaching the point of consisting entirely of information on perceivable aspects of the objects. Those selected aspects of the objects, which are conveyed through the visual gestural signs and that constitute the denomination of the object, are themselves based on a schematization of the image of prototypical objects (e.g., as illustrated by the sign for "helicopter" or "tree"), where both the choice of the prototypical objects of a category and the form of their image schematization are culturally bound and language specific enough to require case-by-case studies (e.g., see the various signs for "tree" in various signed languages).

This progression from complete arbitrariness to extensive motivation in the denomination of objects is outlined in example (10), (11), and (12) below where the patterns illustrate (a) the complete arbitrariness of the nouns of oral languages without classification systems, (b) the intermediate case of partially motivated semantics introduced by class terms or numeral classifiers in those oral languages that have them, and (c) the motivated imagery of signed languages. In those patterns, italics are used for the arbitrary lexical material and CAPITALS for the motivated elements of the denomination, with the possibility of some elements being both formally arbitrary but semantically motivated.

(10)	a.	N:	Bottle
	b.	N-Class term:	Bottle-LONG.RIGID
	c.	SIGN:	CONTOUR OF VERTICAL LONG.RIGID object
(11)	a.	N:	Banana
	b.	N-Class term:	Banana-FRUIT/LONG.RIGID
	c.	SIGN:	PEELING GESTURE or CONTOUR OF LONG.RIGID object
(12)	a.	num N	Two persons
	b.	Num–numeral CL N	Two-BIPED persons
	c.	SIGN	Two BIPEDS

The point about the degree of arbitrariness in the process of the denomination of objects of the world in both oral and signed languages is that a measure of semantic motivation can be found in oral languages, precisely in the systems of class terms and numeral classifiers, and that this situation invites a comparison with the types of motivation found in the denomination process of signed language.

A second point of comparison between certain classification systems of oral langages and the denomination process in signed languages is their discourse dependence. It is known that in signed languages, there may be any number of possible signed representations of the same object, depending on the specificity of some of its aspects and of the particular perspective taken on it in the specific act of speech in which it is mentioned. Although in oral languages the denomination of objects through lexical roots is generally presented as stable and not susceptible to such variability, a certain amount of variability can be found in oral languages, precisely when one considers the possible choice of class terms, classifiers, or semantically motivated noun classes of some languages. This is the case with the most prototypical numeral classifier systems where the same objects may be counted from different perspectives. Consider below the possible alternative ways of counting knives in Burmese (13) or T-shirts in Japanese (14), for instance, in constructions of the form [numeral+numeral classifier N], with the additional information of what other objects can be counted the same way:

(13) a. two-LONG.RIGID knives
(with umbrellas, spoons, etc…)

b. two-CUTTING.INSTRUMENT knives
(with axes, scissors, etc…)

c. two-HUNTING.INSTRUMENT knives
(with guns, bows and arrows, etc…)

(14) a. two-FLAT.FLEXIBLE T-shirts
(with paper, table clothes, blankets, etc…)

b. two-CLOTHING T-shirts
(with pants, shirts, dresses, etc …)

The closest comparitors for this phenomenon in signed languages is in the set of classificatory elements known as shape and size specifiers used for the denomination of objects of the world. Those SASS were introduced to nonspecialists of signed languages interested in the phenomenon of nominal classification in general by Supalla (1986), who argued that a basic set of classificatory elements that combine according to certain rules stands behind a seemingly very open variability of the denomination of objects. What remains to be done is a closer comparison between the basic shapes and other elements of perceptual information systematically coded through those SASS and those expressed through their closest counterparts in oral language classification systems (again, class terms, numeral classifiers, and noun classes, where the systems are still semantically motivated enough to permit such a study). Therefore, although SASS are not classifiers per se and are not always kept in full view of the discussion of classifiers in signed languages, they deserve to be included in the discussion for a more comprehensive comparison of the various nominal classification systems of languages of both modalities.

In terms of foci of classifying elements, the two major areas that have been readily identified in all signed languages are those of the lexicon (just considered in the discussion of denomination of objects, through SASS), and of the verbal predicates (with verbal classifiers, also found in oral languages, although less common, and generally less well described, than other classifier systems). One major issue raised by the co-existence of those two systems of classification (lexical class terms and SASS and morphosyntactic verbal classifiers) is of course their different semantic profiles, as argued for nominal classification systems of oral languages. It would appear for instance that the classificatory elements of predicates, the so-called verbal classifiers of signed languages, would be more akin semantically to the semantics of noun classifiers, in their being more like generics. This would confirm the analysis of the major subtype of verbal classifiers in oral languages as having originated in some incorporation process of generic nouns, as argued in Mithun (1986). Furthermore, it would also appear that, in some signed languages at least , there might be other loci of classifying elements corresponding possibly to numeral classifiers, and maybe noun classifiers too, or even genitive classifiers. A more systematic checking of those possibilities remains to be done, both in terms of the structural properties of such systems and of their semantic profiles.

As far as the study of the semantics of nominal classification systems for objects of the world is concerned, a general warning seems necessary at first. It is a warning against a widespread and inherent ethnocentric bias in the study of the semantics of oral language nominal classification systems carried out by outside researchers, usually speakers of languages with no such systems who are offering semantic interpretations of such systems from an outsiders' perspective. One additional issue rarely made explicit, for instance, is whether the system categorizes referents in the world or nouns of the language, as decried by Lucy (2000). This question would need to be established for each system encountered because, as has been mentioned, there is always the possibility that a system that originally handled referents—and a limited number of referent types at that—may evolve into a systematic classification of all nouns of the language, with corresponding loss of semantic motivation of the classification process. The issue is alive for signed language classification also.

The major framework to address the issue of the semantic principles of categorization of nominal classification systems of oral languages has been the proposal by Denny (1976), and indirectly confirmed by Allan (1977), that classifying elements fall semantically into three major domains of physical, functional, and social interaction. Of the combination of form, movement, and localization, which are said to be components of the signs for objects of the world in visuogestual languages, the element of form is most evidently the most available for a comparison with nominal classification systems of oral languages. Less obvious but potentially interesting would be the study of how the elements of movement of signed denominations of objects possibly overlap with the classificatory elements said to be of a functional nature in oral languages.

The account found in Bouvet (1997) of the nature of the signs used for basic objects of the world in French Sign Language is a good place for nonspecialists of signed languages to grasp the alternative modes of denomination of objects of the world available in those languages when attempting a comparison with the semantics of classifying elements of oral languages. As far as the domain of physical interaction is concerned, there seems to be an interesting overlap between the basic shapes of objects retained in both types of languages, such as the FSL signs:

(15) LONG.VERTICAL = bottle
FLAT.RIGID = table
SQUARE VERTICAL = window or mirror

One area of difference between the two types of languages seems to be the systematic addition of information on size and texture in signed languages, which is said to be only secondary and rarer in oral language classification systems, and mostly described for some large numeral classifier systems. Signs including information on the momentary position or state of an object (crumpled, broken, twisted) also find echo in some of the larger numeral classifier systems, in particular, in the area of so-called mensural classifiers. The numeral classifier systems of Tzeltalan languages for instance include hundreds of mensural classifiers derived from special roots, called positional roots, with special morphological functioning and special semantics (see Berlin, 1968). It is also interesting to identify the original shape components of the signs for what are talked about as generics, such as:

(16) BOAT (sail and mast of___) ⇒ vehicle
LONG.RIGID/BIPED ⇒ person

As far as the semantic domain of functional interaction identified in some classification systems of oral languages, no direct equivalent seems to present itself in signed languages; however, as already hinted, a closer study of the movement component of signs that express the movements that accompany the handling of certain objects might be interesting. For instance, oral language classifier systems—typically, possessive classifiers, and partially numeral classifiers—appear to appeal to the function of the object in a resultative way, as shown in the list of common functional classifiers below:

(17)

Classifier	Classified objects
clothing:	Clothes to be worn
food:	Banana/fish to be cooked, and eaten
storing:	Recipients to contain
hunting/fishing.	Instruments to kill, cut, etc.

The denomination of objects in signed languages, meanwhile, keeps track of the physical relation connecting the object to the user in a more dynamic and directly bodily fashion:

(18) Banana BEING PEELED (to be eaten presumably)
Window BEING OPENED (to let air in presumably)
Recipient BEING HELD (e.g., by the handle, to pour out or drink out of, presumably)
CUTTING MOVEMENT (of cutting instruments, for instance)

It would seem that in the area of function and use of the classifying elements in signed languages, the phenomenon would need to be considered from three different perspectives: (a) In the denomination of objects in isolation, as in citation forms out of context, of what are supposedly prototypical and non referring objects; (b) In a topic setting, corresponding to presentational or existential constructions of oral languages, which introduce referring or nonreferring objects, depending on the particular speech act, which also determines the perspective taken on the object; and (c) In the referent tracking process within the predicate, which may be in the predication of any number of types of events, in particular localization, movement, or actions requiring handling of objects.

What would be most interesting for a study of nominal classification in signed languages would be a systematic tracing of the different linguistic expressions of particular objects of the

world of distinctive shapes, considering at least the three discourse situations just outlined. Suggestions for further data to be gathered and analyzed for a more systematic comparison of the nominal classification systems of both oral and visuogestual languages could therefore include the components discussed below, starting with the constitution of a list of a number of objects of various shapes and usages, to be systematically studied in the various types of usage in which they may be found in the language.

Some of the objects of different shapes, size, texture, and function that are most often mentioned in studies of oral language classifiers are the following:

(19) a. Animals of different shapes:
quadrupeds: cat, dog, horse, camel, elephant
bipeds: chickens, ducks, kinds of birds
others: fish, snake, insects, frogs
b. Tree and tree parts:
trunk, branch, roots; leaves, flower
c. Fruits and vegetables of different shapes:
oranges, potatoes, garbanzo beans, peas,
banana, pea pods, green beans, carrots, leaks
d. Items of clothing of different shapes:
coats, dress, T-shirt, scarf, shawl,
pants, blouses and shirts (with sleeves), gloves
tie, belt, hat, shoes
e. Table settings of various shapes:
plates, soup plates, platter, tray,
bowls, cups, glasses, bottles,
silverware
napkins, table cloth, dish towels
f. Vehicles:
car, snow mobile, bus, tank,
bicycle, motorcycle, roller skates, skate board,
sailboat, ocean liner, raft;
airplane, helicopter, rocket
skis, stilts, snowboard
g. Buildings:
house, castle, tent,
tower, skyscraper

There are three kinds of semantics in oral language classifiers: generics referring to entities (people vs. plant), shape (which is primary, with consistency and size as secondary), and function (food, clothing, transportation, tools). It would be interesting to identify the semantics of the two types of nominal classification systems of signed languages, the SASS and verbal classifiers, and then to follow which types of semantics are used in which types of context.

One of the primary issues in the nominal classification systems of signed languages is also that the task of delimiting the paralinguistic mimetic properties of the signs made available by the visuospatial modality of signed languages from the more strictly linguistic signs. This delimiting issue of image formation and sign formation is particularly pertinent for the description of

the elements that are candidates for the status of classifier elements. The issue exists in the types of shapes identified, as well as the notions of texture and size.

In the process of studying the classification systems applying to the diversity of objects mentioned above, one should keep track of the context of use, and separate the denomination process of objects in isolation from the process of setting up a topic in anticipation of a particular speech act. The matter is one of the particular view taken on that object, translated by a particular choice in its denomination. For instance how would a cup or a mug be signed as topic, in the following cases:

(20) about a cup…
  a. to be drunk from
  b. that drops and breaks
  c. to be put on a shelf, to be washed

(21) about a book…
  a. to be said to be on the table.
  b. placed on the table: flat and closed, or standing, or turned over…
  c. to be handed over, to be read, to be bought…

Finally the same objects must be followed through a stretch of discourse after their initial introduction, to observe the forms that serve to make reference to them in the predicate, which is the domain of verbal classifiers. Both paradigmatic and syntagmatic information needs to be gathered about these verbal classifiers. The paradigmatic information would include, for instance, the set of verbal classifiers of a particular signed language, beyond the two instances of persons and cars often mentioned; what is needed is information on how large the list is, what exactly goes into it, and how closed or open it is. *Syntagmatic information* means a comparison of how people and cars are treated in isolation in dictionaries, as generics, and nonreferential entities, as referential entities in discourse, as topics first, and then as arguments of specific predicates later. For instance, when is an animate person a vertical entity person versus a two-legged entity; what is the difference between two-legged persons and ladders, how are distinctions of sex and age/generation, or even social status made for humans (as they are by classifiers in many oral languages). The use of verbal classifiers with the same protagonists and objects (labeled *X* below) in different event types can be compared, as in the following situations:

(22) a. General presentational/existential construction:
  (there is an *X*)
  b. General static localization (there is an *X* there)
  versus specific positional localization
  (there is an *X* sitting/standing/crouching there)
  c. Quantification (there are *Y* number of *X* there)
  d. Event by agent or undergoer:
  (*X* moves, acts, emotes)
  e. Event undergone:
  (agent or force handles, makes, breaks *X*)

A systematic study of the use of verbal classifiers would also include examples of predicates that do not use them, and description of the strategies used then for the expression of the objects.

A good place to observe the dynamics of a nominal classification system of a referent tracking nature is the careful text study of the so called "generics" (candidates for classifiers in that language) of Arrendte, an Australian language studied by Wilkins. Wilkins (2000) offered a very detailed account of how the decision made by the speaker of whether to use a generic at all, and then of which one to chose over another, is a matter of verbal semantics and discourse perspective. His textual approach provides a good modal of how to approach the dynamics of nominal classification systems that have remained highly discourse sensitive.

As already said, and as will be reiterated now, the questions raised here come from a hearing linguist with some familiarity with oral language classification systems but none with signed languages, and are meant as an invitation to consider the type of data that would allow for a closer comparison of the classificatory processes of human languages in all modalities. Many of the issues raised here are, of course, obvious to signers, but they are still difficult to grasp for linguists of oral languages, even linguists used to great varieties of languages, including very diverse Amerindian languages. At the heart of a possible comparison between oral language and visual gestual languages is the issue of the level of iconicity of the signs and their discourse sensitivity. And as emphasized here, the kind of information that would make the phenomenon of nominal classification in signed languages more transparent would be data of both paradigmatic and syntagmatic nature to be compared to the kind of data available in studies of oral language systems. Such data would make obvious how signed languages stand to play a key role in the development of studies of categorization in general and nominal classification in particular in human languages.

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II

Cross-Linguistic Variations in Classifier Constructions and Spatial Language

6

‘Classificatory’ Constructions in Indo-Pakistani Sign Language: Grammaticalization and Lexicalization Processes

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Indo-Pakistani Sign Language (IPSL) is an indigenous sign language used in deaf communities in urban centres of the Indian subcontinent. So far there is no evidence that IPSL might be genetically related to any European or North American sign language, and its grammatical structure is significantly different in many respects from the better documented Western sign languages. IPSL is used, with some lexical variation but a uniform grammar, in southern and central Pakistan and in north western India. It is likely that regional varieties of IPSL are also used in other parts of the Indian subcontinent, with greater lexical variation in some parts than in others, but the exact geographic extent of IPSL and the nature of regional variation have yet to be determined. The data presented here are based on the IPSL variety as used in Karachi and New Delhi. The extensive corpus of data includes texts of various registers: texts based on picture stories, personal narratives, a theatre performance, a signed version of a short story, a formal address to a deaf club, and lectures from a sign language television program (for details on the data, see Zeshan 2000a, pp. 8-12; 2000b, p. 27f). However, grammaticality judgments for constructions not occurring in the data have not been elicited.[1]

This chapter is divided into two parts. In the first part, I describe several constructions in IPSL whose equivalents in other sign languages have been associated with the term ‘classification’. Particular attention is given to the use of these constructions in natural discourse. Examining their function in discourse provides important clues as to whether the term ‘classification’ is appropriate or partially appropriate, or whether the constructions are of a different nature.[2] I argue that geometrical shape descriptions in IPSL are best conceived of as not involving classification in the linguistic sense of the term. Constructions describing the movement and location of entities can rightfully be called classificatory, whereas the subsystem describing the handling of ob-

jects is not grammaticalized enough to be a bona fide classificatory system, although it may be on the way toward true classification. A distinction between texts that are strongly narrative (such as picture stories and personal narratives) and those that are not (such as speeches, lectures, and casual conversation) is important for investigating the correlation between text type and occurrence of the three constructions.

The second part of the chapter pursues some theoretical notions that seem to be of particular importance in these constructions: grammaticalization and lexicalization. Both of these are dynamic historical processes that change over time the grammar and lexicon of a language. Applying these notions to the constructions in question can be helpful in understanding both their nature within a particular sign language and the nature of cross-linguistic differences in this domain.

'CLASSIFICATORY' CONSTRUCTIONS IN IPSL

Three types of IPSL constructions are examined in this section: signs and signed sequences expressing various geometrical shapes, signs expressing actions of handling objects such as 'giving', 'taking', 'putting', and so on, and productive combinations of movement and handshape expressing the movement and/or location of entities. These groups roughly correspond to some earlier classifications proposed on the basis of other sign languages (e.g., SASS, HANDLE and CLASS in Schick, 1985, for ASL; 'x-type of object' and 'handle x-type of object' in McDonald, 1982, for ASL; 'whole entity' and 'handle' stems in Engberg-Pedersen, 1993, for Danish Sign Language; 'visual-geometric description', 'handling' and 'motion and location' in Schembri, 1996, for Auslan). I also mention some alternative constructions that are available in IPSL to express equivalent meanings. Finally, I describe how the use of the constructions in question correlates with text types.

Geometrical Shapes

IPSL has a rich system of expressing various geometrical shapes and their spatial relationships. Some examples are represented in Fig. 6.1, with the geometrical forms on the left side and examples of use on the right side. Formally, signs for geometrical shapes are of three types: (a) the hand or hands trace the outline of an object, that is, the sign includes a movement path (Figs. 6.1.3, 6.1.4 and 6.1.6); (b) the hand or hands are held still and represent the outline of an object (Fig. 6.1.5); and (c) the hand represents the object itself, not an outline thereof (Figs. 6.1.1 and 6.1.2).

Signs for geometrical shapes can vary productively as to their place of articulation in space, their orientation in space, their size (except where the hand stands for the object itself, Figs. 6.1.1 and 6.1.2), and their arrangement relatively to each other if the sign is repeated. The number of possible forms is very large, making this kind of construction one of the most productive subsystems in IPSL.

Sometimes the use of these signs looks similar to noun-classifier phrases in spoken languages, such as in these examples from Burmese (from a well-known paradigm with various classifiers, see Aikhenvald 2000, p. 319):

(1a) myiʔ tδ tan
river one line

'a river conceived of as a line' (e.g., as drawn on a map)

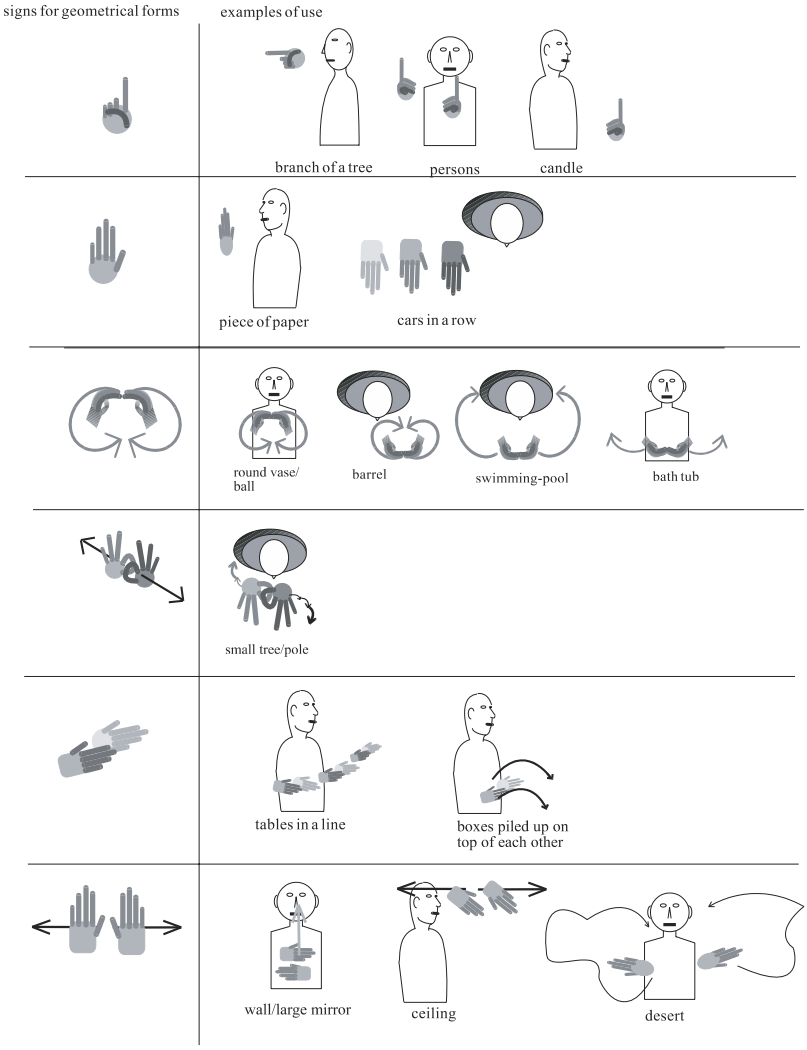


FIG. 6.1. Geometrical shape descriptions in IPSL.

(1b) myiʔ tδ ‘sin
river one distant arc

‘a river conceived of as a distant arc’ (e.g., as a path to the sea)

Here the classifiers ‘line’ and ‘distant arc’ give some additional information about the shape of the noun ‘river’. Compare this with the following example from IPSL:

(2) CAR LARGE-PIPE

‘a long, large car’ (i.e., a minibus)

Here the car seems to be classified by the sign LARGE-PIPE that adds information about its shape (the sign 'car' is made with the hands imitating the handling of a steering wheel and thus provides no information about the shape of the car). It is probably this type of construction that has led to geometrical shape signs, or the handshapes used in geometrical shape signs, being called classifiers. This construction seems to be quite frequent in other sign languages. For instance, there are numerous examples of this kind in Baker-Shenk & Cokely (1996, p. 308ff), representing meanings such as 'table circular-medium-size-outline', 'paper green rectangular-narrow-outline', 'light multiple-small-round-bulbs', and 'tree large-pole'.

However, constructions such as in (2) are rather rare in IPSL. The typical and by far the most frequent environment in which geometrical shape signs occur is one where no specific object is mentioned. The signs denoting a particular shape typically occur by themselves and the particular objects being talked about have to be inferred from the context. In fact, this is one of the main strategies in IPSL to compensate for a rather small basic vocabulary. Because a very large number of objects do not have a conventional lexical sign to refer to them, the way to talk about them is by describing them in terms of their geometrical properties. This can be seen in the following example (cf. Fig. 6.2):

(3a) TREE SQUARE ROUND ROUND EXISTENTIAL.

'There is a square shape with two round shapes inside it at a tree'. (i.e., a target fixed to the trunk of a tree)

(3b) I SHOOT-front

'I shoot at it'.

There is no conventional sign in IPSL to refer to a target of the type intended in the sentence. Therefore, the signer produces a description in terms of its geometrical shape, and the meaning becomes clear from the context, especially in the context of the second sentence (3b) with the sign SHOOT.

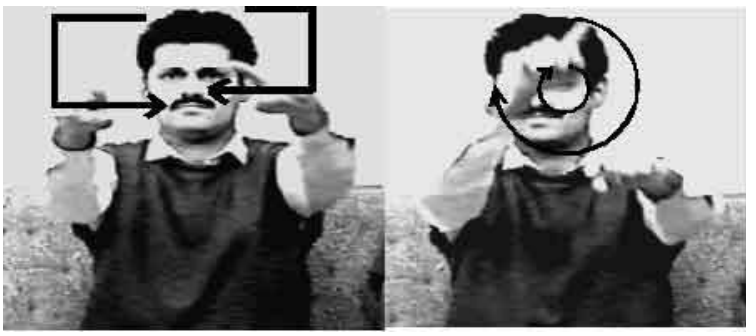


FIG. 6.2. (TREE) SQUARE ROUND ROUND (EXISTENTIAL).

The following example is similar in nature:

(4a) SQUARE VERTICAL-SURFACE COMB-HAIR.

'(Someone) is combing his hair in front of a large square object with a smooth surface'. (i.e., in front of a large mirror)

(4b) LOOK-AT-front ALL-RIGHT.

'He looks at (himself in the mirror), "all right"'.

Although there is a conventional sign 'mirror' in IPSL (see Fig. 6.8.6), this sign most often refers to a small mirror for looking at one's face. When a more detailed description of the object is essential, a productive construction with geometrical shape signs is preferred. In text (4), the signer wants to specify a particular type of full-size mirror (the signs SQUARE and VERTICAL-SURFACE cover the greater part of the sign space from above the head to the legs of the signer), and again it becomes clear from the context what is being talked about because of the co-occurring signs COMB-HAIR and LOOK-AT (which is directed at the location where the geometrical shape signs were made). It should have become clear by now that the examples of geometrical signs in Fig. 6.1 do not actually mean 'swimming-pool', 'pole', 'ceiling', and so on, but are only interpreted as such in context. The same signs could refer to another object in a different context, and conversely the same object can be referred to by different geometrical shape constructions depending on how the object is construed visually.

Signs for geometrical shapes are used in all text types because in all text types, there are situations where the signer wants to refer to some entity for which there is no conventional IPSL sign. In this function, usually only one sign or a compound-like combination of two signs is used. However, in narrative texts, one often finds longer sequences of signs for geometrical shapes that are used to outline the spatial setting of the narrative. This is particularly common at the beginning of a text or a new discourse paragraph. It seems to be a preferred discourse strategy in IPSL to initially create a visual setting for the action to follow. This discourse strategy is an example of the 'film-like potential' that can be exploited so skillfully by sign language users. The signer constructs a visual representation of the surroundings, and because the signs can be used productively in countless variations, a situation can be represented in great detail, yet with great economy of expression. Long sequences of expressions for geometrical shapes are particularly characteristic of texts that are based on visual stimuli (i.e., picture stories or descriptions of pictures). It seems that seeing the situation results in a more elaborate signed reconstruction of the geometrical outlines involved. Examples (3) and (4) are taken from such texts.

Having described the typical use of constructions with geometrical shape signs, what does this mean for an analysis in terms of classification? It seems clear that signs for geometrical shapes in IPSL do not classify another sign because in the typical case, they are used precisely because there is no such other sign. Rather, the signs are a way of abstractly referring to objects in terms of their visual properties. In other words, even though the real-world objects referred to are categorized in terms of their appearance, classification in the linguistic or grammatical sense of the term is not involved. Whereas cognitively based classification is omnipresent in human language and can be achieved in many ways, we do not speak of classification in a linguistic sense in all cases of cognitive classification.

Productive combinations of geometrical shapes often become lexicalized. When a combination that was originally freely coined is regularly used for a particular referent, it may become a conventional sign. This process is discussed in more detail in the section beginning on page 130 (*Lexicalization*).

Movement and Location of Entities

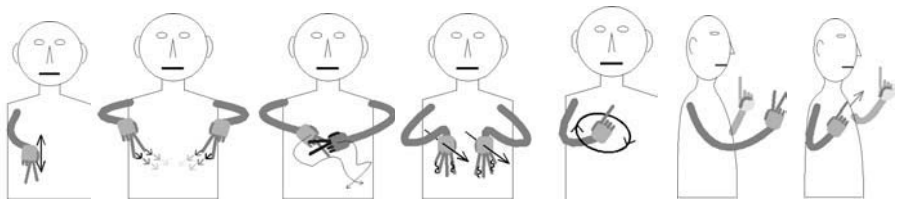
A common problem in determining whether a given construction involves classification in a grammatical sense is to distinguish between a classificatory construction and selectional restrictions. We speak of selectional restrictions if a verb or predicate "selects" its subjects or objects, i.e., if it can only co-occur with certain types of nouns. However, it is not enough for a predicate to be obligatorily combined with a particular kind of subject or object in order to be called a classificatory construction. If this were the case, German posture verbs such as *stehen* 'stand' and *liegen* 'lie' (cf. Borneto, 1996), and English verbs such as 'drink' (only liquid objects) and 'chew' (only 'chewable' objects) would be instances of classification. However, as Allan (1977) notes, they are not: "[I]f a language has noun classes entailed by co-occurrence constraints between nouns and their modifiers or predicates, this does not make it a classifier language; if it did, every language would be a classifier language, and the label would become meaningless" (p. 290). Even though we continuously classify the objects in our world when we talk about them, this does not mean that every language can grammatically be called a classifier language. The classification of real-world objects can be expressed in many ways and is quite distinct from classification in a linguistic sense.

To address the problem of drawing a line between selectional restrictions and true classification, I proposed definitional criteria in Zeshan (2000b, p. 120). The rationale behind this approach is that selectional restrictions will be considered the default case, and classification is only assumed when there are strong arguments in favor of such an analysis. The two decisive criteria are the following: (1) There must be overt morphological marking of classification, and (2) there must be an organized paradigm of contrasting classificatory forms.

The first point means that there should be an identifiable morpheme or sublexical component of the sign carrying the classificatory meaning, in other words, no classification without classifiers. This seems trivial at first sight, but in the case of sign languages, it can indeed be difficult to decide when a handshape is a classifier morpheme and when it is "meaningful" due to its iconicity, but not clearly morphemic (such as in the IPSL sign 'airplane', see below).

The second criterion refers to the organization of a construction where a well-defined set of grammatically contrasting morphemes can alternately occupy a certain slot within the construction. Thus a choice is made among the members of the classifier paradigm to indicate to which linguistic class an entity belongs. In the case of sign language classifiers, the slot for the classifier morpheme is the handshape, and the choice of handshape expresses the type of referent involved.

According to these criteria, IPSL has a very small, yet well-organized paradigm of two classificatory forms: the 'legs' classifier and the 'person'[3] classifier (see Figs. 6.3 and 6.4). Other possible candidates, some of which have in fact been called classificatory in other sign languages, are ruled out and are considered cases of selectional restrictions. For example, the sign 'airplane/fly by airplane' is not considered classificatory here because it is difficult to argue for the morphemic status of the handshape (the 'Y-hand' with thumb and little finger extended). There are no morphological alternations that would demonstrate the independent morphemic status of the handshape in this sign. By contrast, the 'legs' and the 'person' morphemes do take part in



3.1 3.2 3.3 3.4 3.5 3.6 3.7

3.1: 'jumping'
3.2: 'two people approaching each other'
3.3: 'people falling all over each other'
3.4: 'many people walking'
3.5: 'person moving around in a circle'
3.6: 'two people confronting another person'
3.7: index directed at 'person' classifier

FIG. 6.3. Examples of use of the 'legs' and the 'person' handshape.

morphological alternations. For example, the handshape in 'legs' varies according to number (two fingers extended for singular, four fingers extended for plural), and the handshape in 'person' participates in numeral incorporation.[4] The two forms are paradigmatically organized in that each occurs in its own set of only partially overlapping contexts. I now describe use of these forms in more detail.

The 'legs' classifier is used in the following contexts (examples in Figs. 6.3.1 to 6.3.4):

- To show the position of referents in space;
- for simple movements (line, curve, random, etc.);
- to express the type of movement (walking, jumping, falling etc.), e.g. Fig. 6.3.1;
- for plural forms, i.e., indicating an unspecific number above two, e.g. Fig. 6.3.4;
- to express complex movements of two referents in two-handed signs, e.g., Fig. 6.3.2;
- with variable orientation of the hands, to express body postures ('stand', 'lie'), e.g., Fig. 6.3.3.

'Legs' is *not* used in the data to express a specific plural number nor as the goal of directional predicates and indexes.

The 'person' classifier is used in these contexts (examples in Figs. 6.3.5 to 6.3.7):

- To show the position of referents in space;
- for simple movements, e.g., Fig. 6.3.5;
- to express specific non-singular numbers in numeral incorporation, e.g., Fig. 6.3.6;
- as the goal of directional predicates;
- as the goal of an index point, e.g., Fig. 6.3.7.

'Person' is *not* used in the data with varying orientation of the hand, to express types of movement, for unspecific plural forms, nor for complex movements of two referents. So both con-

structions only overlap in the two least complex environments: representing the position of referents and simple movements of referents.

In agreement with the different contexts of use, the morphological alterations that 'legs' and 'person' can undergo are also different: 'legs' is subject to a change in handshape according to number, with a V handshape (as in Fig. 6.3.1) for singular and a 4 handshape (as in Fig. 6.3.4) for plural. Handshapes with four or five extended fingers are used regularly in IPSL to express plurality (see Zeshan 2000b, p. 79ff), so that the form 'legs'-4 is best considered to be the plural of 'legs'-V rather than a third classificatory handshape of its own. Internal movement of the fingers can be modified according to the type of movement, for example, straight fingers for 'standing' and 'jumping', wiggling fingers for 'walking'. And the orientation of the hand varies, for example with fingertips downward for 'walking' and sideward for 'falling'. The handshape of 'person' is subject to numeral incorporation for numbers up to five, but there are no other morphological modifications to the handshape.

There are a number of restrictions on the use of these signs. These are of two kinds: (a) constraints on the use of 'legs' and 'person' with each other, and (b) constraints on the use of 'legs' and 'person' with other signs.

In the data, 'legs' and 'person' are never combined with one another, so that one of them would be represented on each hand. Moreover, all two-handed examples of 'legs' in the data have both hands either in V- or in 4-handshape. This is true even in cases where the situation to be represented (e.g., from a photo stimulus) involves several referents interacting with a single referent (e.g., several ducks walking behind a man). The 'person' classifier can have different handshapes on both hands, although this is rare (Fig. 6.3.6 is an example). The constraints operating within and between 'legs' and 'person' hold independently of whether the hands are moving or are stationary.

On the other hand, combinations with other signs depend on whether the hands are moving or stationary. Examples of such combinations in the data involve 'legs', but not 'person'. Figs. 6.4.1 and 6.4.2 show examples of 'legs' in combination with a stationary hand representing a geometrical shape. This combination is regularly allowed. Note that there is no articulatory reason why combinations with 'person' should not be possible. However, such combinations do not

4.1:'person walking on a jetty'

4.2: 'person crossing a street on a pedestrian bridge'

FIG. 6.4. Two-handed combinations with 'legs' classifier.

occur in the data. 'Legs' can also be combined with a stationary 'handling' handshape as in Fig. 6.5.5 (the right hand is 'walking', the left hand is holding the flower).

Combinations of two different handshapes that are both moving do not occur. Therefore, classifier forms are never combined with nonclassificatory movement signs, such as the one-handed signs 'come', 'go-to' and 'go-away'. These signs can be used with any kind of referent, be it a person, a vehicle or an animal, and their meaning simply involves 'moving from one location to another location in an unspecified way'. Because there are no classificatory handshapes that are used for vehicles in IPSL, signers use these nonclassificatory signs to express path movement with vehicles. Although signs denoting vehicles are systematically ambiguous between 'vehicle x' and 'go by vehicle x', in most cases they cannot indicate path movement. So to represent the movement of a person and a vehicle, for example, to indicate a car running over a person, it seems that the two entities have to be represented sequentially rather than simultaneously on both hands. It is not possible to use the sign GO-TO on one hand (a flat handshape in vertical position, with all fingers extended and facing forward and the palm facing sideward) and a 'legs' or 'person' construction on the other hand.

The rather sophisticated constraints associated with 'legs' and 'person' in IPSL are summarized in Table 6.1. They provide evidence for the advanced grammaticalization of this subsystem.

Productive constructions describing the movement and location of entities are highly frequent in many of the narrative texts in the data. Signed stories with interactions between several participants, such as some of the picture stories I used for data elicitation, are particularly likely to include these constructions. However, they rarely occur in formal texts or in casual conversation.[5] Assuming that this is true of other sign languages as well, a predominance of narrative texts in the data used for sign language research may have resulted in some overestimation of the role of classificatory constructions. In IPSL, it is certainly possible to produce entire texts of, say, 15 min length, without using a single such form (excluding lexicalized forms that have developed from such constructions; see the *Lexicalization* section beginning on page 130).

TABLE 6.1

Constraints on the use of 'legs' and 'person'

Type of Construction	*'legs'*	*'person'*
position of referent in space	+	+
simple movements (line, curve, random, etc.)	+	+
type of movement (walk, jump, fall, etc.)	+	–
variable orientation (stand, lie, etc.)	+	–
unspecific plural (4 and 4–4)	+	–
complex interactions with two referents (V–V)	+	–
combination with geometrical shape on passive hand	+	–
combination with 'handling' handshape on passive hand	+	–
combination V–4	–	–
combination 'legs' and 'person'	–	–
combination with non-classificatory movement sign	–	–
specific non-singular (numeral incorporation)	–	+
goal of directional predicate	–	+

Handling Objects

The equivalents of predicates of handling such as 'give', 'take', 'put', 'throw', 'hold', and so on are often expressed by a combination of a handshape and a movement in IPSL. At first sight, the construction looks very similar to what has been described for other sign languages: the 'classifier' handshape is chosen according to what kind of object is being handled, and the movement is modeled on real-world movement, i.e., is an idealization of real-world actions. However, looking at a larger number of texts in IPSL, one can see that the character of these constructions appears to be different from other sign languages. Beginning on page 123 (*The Grammaticalization of Gesture*), I attempt to describe this difference in terms of the notion of grammaticalization and argue that this subsystem has progressed less far on the grammaticalization path in IPSL than in other sign languages. This section will take a closer look at the data first.

The main point to be made here is that the choice of handshape in these constructions seems to be improvised rather freely in IPSL. This does not mean that the choice of handshape is random (i.e., that any handshape could be used in combination with any object). There clearly is a relationship between the objects handled and the handshape used, but this relationship does not suggest that IPSL has a well-organized paradigm of grammatically contrasting handshapes to be used in 'handling' constructions. An example from the data should make this point clear.

Within a single text, all handshapes shown in Fig. 6.5 occurred to describe the handling (carrying, giving, taking) of one and the same object, a flower. There is no semantic or structural difference at all that would provide a reason for the handshape variation. A similar amount of variation can also be found in the data for other kinds of objects, such as cup-shaped, box-like, and very small objects. Where it is physically and gesturally plausible, signed constructions can freely vary between one-handed and two-handed constructions (Fig. 6.5.2), the orientation of the hand can vary (Fig. 6.5.4), and any fingers or parts of the hand that are not strictly necessary for handling the object may be either folded in or extended. Note that it is not the case that all the differences between handshapes in Fig. 6.5 are generally nonphonemic in IPSL, so that all handshapes would be non-distinctive variants of each other. For example, the handshapes in Fig. 6.5.3 and 6.5.4 can be used in the sign ACCOUNTING, but those in Fig. 6.5.1 and 6.5.5 cannot, and hand orientation is not variable in this sign. Similarly, only the handshape and hand orientation in Fig. 6.5.5 is used in the sign CHAIR, while the other forms are impossible. The variable handshape choice as exemplified in Fig. 6.5 is also in sharp contrast with lexicalized signs that are based on 'handling' constructions (see page 130, *Lexicalization*). Here all formational as-

5.1 5.2 5.3 5.4 5.5

FIG. 6.5. Varying handshapes for describing the handling of a flower in IPSL.

pects of the sign are fixed, and the formation of the signs only varies according to general principles operating in the language as a whole, for example a rule for dropping the passive hand.

The conclusion from the data is that in 'handling' constructions in IPSL, any hand configuration that a person would use in a real-world action to handle the object can be used to describe a corresponding situation. This is what I mean by improvised choice of handshape, and it is different in character from a tightly organized subsystem with paradigmatically contrasting handshapes. Western sign languages have been described in terms of such a well-organized subsystem, often with tables or lists of distinct 'morphemes' provided (e.g., Corazza, 1990; Schembri, 1996). If this description is appropriate, there is a difference between these constructions and the constructions used in IPSL. The difference would be due to the fact that IPSL is much closer to the gestural origin of the construction and that other sign languages have grammaticalized their systems further. It is because of the improvised and gestural nature of the IPSL 'handling' constructions that the handshapes cannot really be called classifiers or morphemes. Although the construction may be developing into a more grammaticalized form, it does not qualify as a true classificatory construction according to the criteria applied here. The most appropriate way of characterizing the construction seems to be to speak of a pre-classificatory subsystem or a case of incipient classification, with the potential of developing into a bona fide classificatory construction. The notion of the 'handling' construction being at the beginning of a grammaticalization path that leads to a grammatical category of classifier morphemes is explored in detail and contrasted with a truly classificatory system in the section about the grammaticalization of gesture beginning on page 123.

Another important point to be noted is that productive 'handling' constructions are not the only way of expressing situations of 'giving', 'taking', 'putting', and so on. There are two other ways of talking about these in IPSL, overlaid movement patterns and conventional lexical signs. There is a semiproductive mechanism in IPSL by way of which movement patterns can be added to signs denoting objects. So instead of using one of the handshapes in Fig. 6.5, one can also just make the sign for 'flower'[6] and add a movement path to the sign itself to express the meaning of 'giving a flower to someone' (see Fig. 6.6 for another example). This construction is applicable to a limited number of signs, but the conditions of applicability are not yet well understood.

There are also several conventional lexical signs in IPSL for 'giving' and 'taking' (described in detail in Zeshan, 2000a, p. 76f). These lexical signs tend to have more specific semantic connotations, such as 'take and keep (in one's hand)', 'collect', 'offer, present, give a gift' and 'give, leave, send, throw'. They are either used when one of the more specific meanings is intended, or when the object is unexpressed, something abstract (e.g., 'percentage', 'job', or numerals), or something that cannot be held in the hand (e.g., 'house', 'child'). In these cases, a 'handling' construction is not possible. However, there are also examples in the data where lexical signs are used with objects that do not fit into any of the above categories and where a 'handling' construction or a construction with an overlaid movement pattern could have been used.

The factors governing the choice of these three alternative constructions are not yet well understood. Different forms can be used alternatively in similar situations. For example, in one story about catching a fish, an overlaid movement pattern is used to express 'taking the fish out of the bag and putting it on the table' (see Fig. 6.6). In other instances taken from exactly the same story, FISH is combined with one of the lexical signs for 'give' or with a productive 'handling' construction. Whatever the exact rules for the distribution of each construction may be, the argument to be made here is that it is not clear from the data whether productive 'handling' constructions are ever obligatory in any context in IPSL. The evidence so far suggests that they

'Fish' '…took the fish out of the bag and put it on the table'

FIG. 6.6. Overlaid movement pattern expressing the handling of an object.

are not, and this would be another argument in favor of an analysis that portrays these constructions as a weakly grammaticalized subsystem of IPSL grammar. By contrast, the classificatory movement/location constructions described in the previous section do seem to be the only way of expressing certain meanings.

Combinations of handshape and movement describing the handling of objects show a marked difference in frequency across text types. Looking at the available literature about various sign languages, the multitude of 'classifier' forms reported might give rise to the impression that these constructions are highly characteristic of sign language in general. At least for IPSL, this is not the case. Rather, they are used predominantly in certain text types and occur much less in others. The 'handling' constructions are much more frequent in narrative than in nonnarrative texts. One environment where 'handling' constructions are preferably used is where complex manual actions are described in some detail. For example, in one text, a signer describes his duties in a car factory, assembling and welding parts of a motor block. In such contexts we can see longer sequences or multiple occurrences of 'handling' constructions.

The underlying reason for the uneven distribution of both movement/location and 'handling' constructions seems to be that narratives tend to be more action-oriented, whereas other text types are more content-oriented. This has consequences for the type of constructions used. The constructions described in this chapter can all serve to give a vivid visual description of the situation, and this naturally goes together with narrative texts. Collins-Ahlgren (1990) made a similar observation comparing Thai Sign Language (THAISL) to spoken Thai:[7]

> In spoken Thai, generally, the more formal the register, the more extensive and richly dotted is classifier use. Usually a smaller set of classifiers is used in informal speech. In THAISL, however, a high degree of formality is correlated with less classification, and informality correlates with more classification. (p. 115)

Such observations underscore the necessity of looking at a variety of text types in any given language in order to decide which phenomena are characteristic of the language as a whole and which apply to particular text types only.

GRAMMATICALIZATION AND LEXICALIZATION

The discussion of the three construction types, geometrical shape constructions, 'handling' constructions and movement/location constructions, has shown that these constructions show important differences both across different sign languages and across different constructions within one and the same sign language. The conclusion therefore must be that the question of whether a construction involves classification cannot be simplistically answered in the positive or in the negative for all candidate constructions and all sign languages. Rather, evaluation of constructions on language-internal criteria can lead to quite different results even within one and the same sign language.

In this section, I explore the theoretical notions of grammaticalization and lexicalization as they pertain to the constructions discussed. The two IPSL constructions of movement/location and 'handling', representing a classificatory and a pre-classificatory subsystem respectively, are compared with respect to the notion of grammaticalization. It is argued that this parameter provides an insightful way of thinking about the differences between these and other similar constructions in other sign languages. Secondly, lexicalization processes in all three constructions are investigated to demonstrate their highly productive and creative character and to draw conclusions for the nature of the IPSL lexicon as a whole.

The Grammaticalization of Gesture

Grammaticalization theory is one of the more recent theories of general linguistics.[8] The theory stresses the dynamic nature of language. It outlines how independent lexical items become grammatical markers and how less grammatical structures become more grammatical. Certain constructions are repeatedly created from the same or similar lexical sources, so that such developments have been called grammaticalization paths. These are usually held to be unidirectional. In a prototypical case, independent words would attach themselves to other words, cliticize, and then develop into affixes. A number of changes to the source forms tend to happen in the course of grammaticalization: the source forms lose phonological content; they become "desemanticized," that is, their meaning becomes more abstract; a paradigm of contrasting forms is established; the emerging paradigm tends to be gradually reduced in number, with some forms selected and generalized while others fall out of use; and the newly created grammatical category gradually becomes obligatory in certain contexts. In spite of all these changes, some characteristics of the source form are often retained in the grammaticalized form at various stages of development.

Because grammaticalization is a gradual process over time, historical information about a language is important to trace the development of a particular grammatical marker. Given that historical data from signed languages is scarce or nonexistent, one might argue that grammaticalization theory cannot be applied to signed languages for lack of evidence. However, this situation also holds for many spoken languages that do not have a written tradition. In these cases, grammaticalization theory resorts to comparing languages from the same language family with respect to the grammatical category under investigation. These languages may turn out to be at different stages along the grammaticalization path, so that a historical development can actually be seen synchronically across different languages. I propose that this procedure should also be possible for different sign languages and different constructions within one and the same

sign language. The explanatory value of such a procedure is demonstrated in the analysis of the 'handling' and the movement/location construction in IPSL.

The constructions described here look remarkably similar across signed languages, at least at the present stage of knowledge. In what follows, I explore the hypothesis that a common gestural origin and a similar grammaticalization process lead to cross-linguistically similar constructions. However, it is still an open empirical question whether the types of gesture involved here are common to all cultures in which sign languages have been studied, or maybe even to all humans. There has been much evidence recently that gesture is used differently in different countries, cultures, and language communities. The internal composition and complexity of gestures may vary, and even gestural behaviour that is supposedly as simple as deictic pointing varies remarkably cross-culturally (cf. Wilkins, in press; Kita, in press).

Of the various types of gestures that have been identified in the literature (see McNeill, 1992), the ones that are eligible as sources for the two constructions under discussion are subtypes of spontaneous iconic gestures. The 'handling' constructions would derive from a gesture where the person enacts a real-world situation, mapping his own body to the body of the referent about whom he is talking. For example, someone might talk about how a character in a story was caught by another, and accompany this description with a grabbing hand gesture, impersonating the other character. Movement/location constructions, on the other hand, would derive from gestures where the hand stands for something else, in this case, a person or an animal. For example, a verbal description of how a person or animal climbs up a ladder might be accompanied by a gesture where the index and middle fingers of the hand move upward while wiggling. The use of these two fingers to represent human or animal legs seems to be very widespread at least across Western cultures and is ritualized, for instance, in nursery rhymes played with young children.

Spontaneous iconic gesture is distinct from conventionalized gesture, which involves a culture-specific inventory of well-defined gestures that can often substitute for particular words, such as the "thumbs up" gesture for 'good' in many European countries. These gestures are not necessarily iconic, and they often become part of the conventional sign language lexicon (see, e.g., Zeshan 2000a, p. 38ff). Spontaneous gestures, on the other hand, do not have a predetermined, conventionalized form, but are created "on the fly" while speaking. Both types of gestures occur in the natural spontaneous discourse of hearing people with no knowledge of a signed language.

Many different factors are involved in creating a morphosyntactic subsystem from gestural input, some of which have already been mentioned in other contexts throughout this chapter. To sum these up at this point, the following effects and processes are characteristic of grammaticalization and apply to the grammaticalization of gesture as well:

Loss of Phonetic Substance. This is one of the most characteristic features of the grammaticalization process. A full lexical item typically has more phonetic substance than a clitic, and a clitic tends to have more phonetic substance than an affix. In application to a signed language, phonetic of course needs to be reinterpreted as gestural substance. This is straightforward in cases such as cliticization, where, for example, a cliticized index point loses stress and syllabicity (see Sandler, 1999). However, in the case of 'handling' and movement/location constructions, it is more difficult to define loss of gestural substance because these are simultaneous constructions and not typical sequences of lexical host and grammatical marker. One point to make in this context is that sign language takes place in a constrained sign space, about an arm's

length to each side in front of the torso. Signs do not usually extend beyond this conventional sign space. Gestures, on the other hand, do not seem to be limited in a comparable principled way. Moreover, it may be argued that sign language constructions have a stronger tendency toward representing situations in a shortened, idealized way than gestures. Although gestures may also involve greater or lesser idealization of the real-world situation to be represented, there are no linguistic constraints on their form, so that gestures may be elaborated more freely than signs. It would seem that movement/location constructions are generally more idealized and less prone to gestural elaboration because of the higher level of abstraction involved, with the hands representing another entity. 'Handling' constructions, on the other hand, involve less idealization because the hand represents itself and does not stand for another entity.

Paradigm Formation (Paradigmaticization). A set of forms is created that are in paradigmatic contrast. The choice of possible gestural forms is narrowed down in favor of an organized set of well-defined linguistic forms that occur under specifiable conditions. With increasing grammaticalization, there is also a tendency of reduction of the paradigm. As some forms become more general in use, others fall out of use and the number of paradigmatically contrasting forms is reduced. The difference between the choice of handshape in 'handling' constructions and in movement and location constructions in IPSL falls into this category. In the less grammaticalized 'handling' constructions, although the number of categories referred to by the handshapes is finite, the number of individual handshape forms that can be used is indefinite and these forms are not organized as a tightly structured paradigm. On the other hand, the highly grammaticalized movement and location paradigm has only two members with each occurring in a well-defined set of contexts.

Obligatoriness. The form paradigm becomes a grammatical category and is obligatorily used in certain contexts. It has been noted above that the 'handling' construction is probably not strictly obligatory in IPSL in any context because two alternative nonclassificatory constructions that cover a similar range of meaning are available. In fact, it seems that the conventional lexical signs for 'giving' and 'taking' are more inclusive than 'handling' constructions, because they can apply to both abstract and concrete objects, whereas 'handling' constructions can only apply to concrete objects. By contrast, movement and location constructions seem to be somewhat more obligatory in that some meanings cannot be easily expressed in a different way. For example, it is rather difficult to talk about types of movement, such as 'jumping' or 'falling' without using a form that involves the 'legs' classifier in some way. On the other hand, it should be stressed that it is not possible to say whether any of these constructions is fully obligatory in any context because grammaticality judgements that would provide evidence for full obligatoriness have not been elicited.

Combinatory Restrictions.[9] With increasing grammaticalization, there will be language-specific restrictions on which combinations of morphemes are possible. Some very specific restrictions have been shown to hold for movement and location constructions in IPSL (see Table 6.1). The only restrictions that apply to the 'handling' constructions are those involving two-handed combinations. A 'handling' handshape can be combined with 'legs' and with a geometrical shape, and the same 'handling' handshape can appear on both hands. However, these restrictions are less specific than the ones for movement and location constructions and largely coincide with general restrictions on the formation of two-handed signs.

Desemanticization. The meaning of forms tends to shift from more concrete to more abstract in grammaticalization. This happens through the loss of concrete semantic features that were part of the original form but have been "bleached out" in the grammaticalized form. On the other hand, this is also accompanied by semantic gains insofar as the grammaticalized form can be used in a greater variety of contexts. In IPSL, the 'handling' forms show little evidence of desemanticization. There are a few lexicalized signs where the notion of 'grasping' is metaphorically transferred to the mental domain, e.g., in the sign GET-TO-KNOW, which is based on a closing movement of the hand, but articulated on the forehead. In both the 'handling' and the movement/location construction, the component of path movement does not seem to shift to a more grammatical meaning as it does, for instance, in the case of transitive concepts expressed through directional movement in IPSL. However, both the 'legs' and the 'person' handshape show some limited effects of desemanticization. The 'legs' classifier has a concrete semantic base reflected in the V-handshape, but this iconic base becomes less obvious in the plural forms with the 4-handshape. It is not the case that each finger represents a leg in plural forms because in this case the 4-handshape would refer to *two* persons when in fact it refers to *any plural* number of persons. The 'person' form has been generalized from its putative origin as a prototypical upright human figure to include reference to animals as well. Although this is very rare, it is possible to use the 'person' handshape in contexts where the semantic feature 'upright human figure' is lost. For example, one signer used a dual form of 'person' to refer to two approaching birds. Interestingly, this happened in the context of a fairy tale where the birds had some human characteristics such as the ability to talk, so the semantic shift has probably not gone very far yet.

If all these parameters are taken together, there seems to be clear evidence that the 'handling' system is weakly grammaticalized, whereas the movement and location system is highly grammaticalized. 'Handling' constructions are closer to their gestural origin and display more gestural than morphosyntactic characteristics. Movement/location constructions are closer to a grammatical category and so have less gestural and more morphosyntactic characteristics. The grammaticalization path from a gestural origin to a grammatical category is summarized in Fig. 6.7. The corresponding subsystems in other sign languages can also be positioned along this grammaticalization path and may be shown to be more grammaticalized or less grammaticalized than the ones in IPSL. Available descriptions (e.g., Corazza, 1990; Schembri, 1996; Supalla, 1986) certainly suggest that some Western sign languages have 'handling' constructions that are more grammaticalized than the ones in IPSL, in particular as far as paradigmaticization is concerned.

Let us now take a synchronic perspective for a moment. As Heine, Claudi, and Hünnemeyer (1991) put it: "One of the main merits of grammaticalization studies after 1970 was that attention was drawn to the potential they offer as an explanatory parameter for understanding synchronic grammar" (p. 13). This explanatory potential will be useful to consider some synchronic effects of grammaticalization on 'handling' and movement/location constructions in IPSL: persistence, layering, and hybrid forms.

A characteristic feature of grammaticalization is that some properties of the nongrammatical source of the grammatical construction are retained. This persistence entails that a construction will have some properties that can be explained in terms of from where it came. The constructions discussed here seem to have a high degree of persistence. The fact that they are highly productive and highly iconic is evidence of their continuing gestural nature. Moreover, the idea of persistence of a gestural origin also correlates well with the fact that these constructions cover

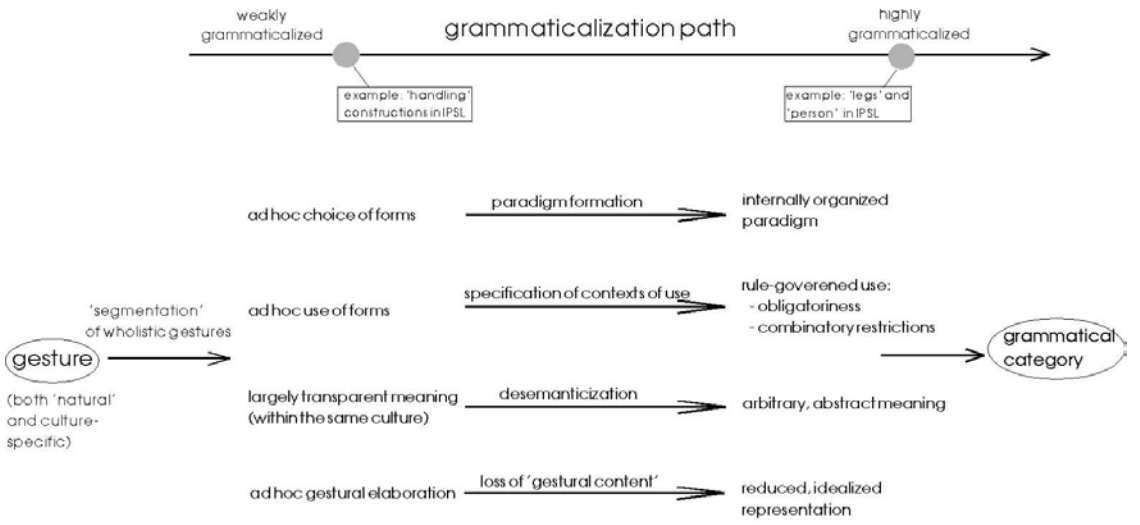


FIG. 6.7. The grammaticalization path.

particular domains of meaning and not others, and that these domains of meaning are the same that lend themselves well to gestural expression. Whereas the handling of objects and the movement of entities are often accompanied by co-speech gestures (cf. the examples in McNeill, 1992, p. 105ff), it is much less obvious that people would use many gestures when talking about colors or chemical elements, for example. Cross-linguistically, it is remarkable that these two domains of meaning are expressed through similar constructions in all sign languages investigated so far.

A related phenomenon is known as layering in grammaticalization theory. Layering is "the synchronic result of successive grammaticalization of forms which contribute to the same domain" (Hopper & Traugott, 1993, p. 124). For example, there may be two different constructions in a language to express relative clauses, an older form and a more recently grammaticalized one. These two forms can co-exist, so that there are two synchronic layers of grammatical structure within the domain of relative clauses. Multiple layers of verb morphology can be found in present day English, with forms such as 'kept on eating' and (more grammaticalized) 'kept eating' co-existing (Hopper & Traugott, 1993). With respect to movement/location constructions in sign languages, Engberg-Pedersen (1993, p. 261) noted that apart from conventional, idealized movement patterns, it is also possible for signers in Danish Sign Language to imitate real-world situations more closely, with productive representation of irregular paths and manners of movement. Within the inventory of movement morphemes, this type of movement is called analogue. Although its use is restricted to more poetic registers, it certainly has its place within Danish Sign Language, and similar forms can also be found in IPSL. There are thus two layers within the domain of movement and location constructions, one that is still close to the gestural origin, and another one that is more conventionalized and subject to grammatical restrictions.

Because grammaticalization is a gradual process over time, it is natural that at any given time, there may be forms in a language that are just about halfway between two stages. Such forms, for example the so-called Chinese "coverbs" that are halfway between verbs and adpositions, are notoriously hard to classify. However, from a grammaticalization point of view, these cases are not really problematic because they are expected and it is not necessary to assign them to one or the other category:

> Somewhere halfway between X and Y there is a stage where the entity concerned cannot be described as being either primarily X or primarily Y since it is made up of a proportionate amount of properties of both categories. When such a stage is reached, we propose to talk of intermediate or hybrid forms. Hybrid forms are part of grammaticalization chains; they are found at the intersection of overlapping stages of the "no longer quite X but not yet quite Y" type. (Heine, Claudi, & Hünnemeyer, 1991, p. 231)

It seems that 'handling' constructions in IPSL can aptly be classified as hybrid forms in this sense. This offers a natural explanation for the fact that this construction displays characteristics that are much more gesture-like than in movement and location constructions. In this framework, we do not need to make an absolute decision about whether we are dealing with gestures or with linguistic constructions here. The 'handling' construction is just a theoretically expected in-between case that has characteristics of both. However, there is an important difference between this case and the hybrid forms that have been described in grammaticalization theory so far. Whereas the quote above refers to a development from a *linguistic* form X to another linguistic form Y, the grammaticalization of 'handling' and movement/location constructions involves the transition from a *nonlinguistic* gestural form to a linguistic form. This is a different kind of process and has various implications that are discussed in more detail below.

From a theoretical perspective then, perhaps the most interesting aspect of applying grammaticalization theory to signed languages is that some common effects and processes of grammaticalization are not applicable to some sign language constructions. In the case of classificatory 'handling' and movement/location constructions, there are two factors that need to be considered: the simultaneous nature of the construction, and the gestural input to the grammaticalization path.

Because the sign language constructions are simultaneous combinations of the various meaningful components of the sign, all grammaticalization processes that presuppose the existence of sequential structure are inapplicable. It is not possible to argue for greater or lesser coalescence of the morphemes involved. Coalescence means that a grammatical marker becomes attached phonetically and morphosyntactically to its host. In the case of simultaneous constructions, one cannot make any argument about a morpheme being 'closer to' or 'further away from' its stem. Also note that it is not clear at all what constitutes a 'stem' and what constitutes an 'affix' in these constructions (see the contribution by Schembri, chap. 1, this volume), and it may indeed be impossible to think about classificatory constructions in these terms.

A process related to coalescence is the fixing of the syntactic position of a morpheme. As the morpheme forms a closer bond with its host, it obligatorily appears in a fixed position in the sentence, whereas in the earlier stages of grammaticalization, there may have been several possible positions for the morpheme. In the case of the sign language constructions, of course, no syntax is involved in the sense of a sequence of signs, so it makes no sense to talk about the position of the sign's components relative to each other.

One of the major mechanisms that drives grammaticalization is reanalysis. An existing linguistic form is assigned a different internal structure, but the surface structure does not change. Two common mechanisms are fusion and rebracketing. In fusion, two or more elements in sequence are reinterpreted as one, as in compounding: cild-had 'condition of a child' > childhood (Hopper & Traugott, 1993, p. 41). Rebracketing involves a reorganization of the constituent structure of the construction, for example, [[back] of the barn] > [back of [the barn]] (ibid.). Grammaticalization in spoken languages need not involve reanalysis in every case. For example, when a numeral 'one' develops into an indefinite article (cf. Givón, 1981), no fusion or rebracketing of the noun phrase is involved. However, this is different from a case where reanalysis of this kind is inapplicable in principle. This is obviously the case for simultaneous constructions in sign languages. In fact, it is hard to say to what extent reanalysis is involved at all in the grammaticalization of 'handling' and movement/location constructions. The only aspect that changes is the status of the elements involved, the development from components of gesture into morphemes of a grammatical construction. This shift from nonlinguistic to linguistic is quite a different type of reanalysis, if we even want to use the term 'nonlinguistic' at all.

Some authors argue for a cyclic nature of the grammaticalization process, involving a progression of this kind: Discourse > syntax > morphology > morphophonemics > zero (see Heine, Claudi, & Hünnemeyer 1991, p. 13). In other words, discourse pragmatic structures become syntactic structures, adjacent free forms in syntax become attached grammatical morphemes, and the latter get reduced in content until they disappear and the whole process begins again with new material drawn from discourse pragmatics.[10] In the grammaticalization of our sign language constructions, there is no discourse stage and no syntax stage. The grammaticalization already enters at the morphology stage, so to speak, directly creating morphology from gesture. Moreover, one may predict that the process will never reach the zero stage because it would be physically impossible to produce the construction with one of the morphemes being zero. For example, phonological erosion of the handshape morpheme up to the zero stage would lead to a form that is physically impossible to produce (i.e., a movement of the hand with no handshape).

The fact that morphology can be directly created from nonlinguistic input is the second important difference between sign language and spoken language grammaticalization. In spoken languages, the source of grammaticalization is already a linguistic form, for example, an independent lexeme. In sign languages, on the other hand, linguistic forms as well as nonlinguistic forms are grammaticalized.[11] Nonlinguistic source material from which grammaticalization can proceed in sign languages is of two kinds: facial expressions and manual gestures. Janzen (1999) discussed the grammaticalization of topic in ASL from a communicative questioning gesture involving eyebrow raise. The grammaticalization path leads from an affective facial expression to a grammatical facial expression. In 'handling' and movement/location constructions, grammaticalization leads from manual gesture to morphological structure. This point is of great theoretical importance, but it has not, to my knowledge, been widely addressed in the literature. As a unique case that seems to be possible in signed languages only, this development is not covered by current grammaticalization theory of any stance.

The fact that the source of a grammatical construction is nonlinguistic has consequences for its description in terms of typical grammaticalization processes. Just as in the case of simultaneity, some of these processes are not applicable or appear in a very different light. Two such processes, which are closely related to one another, are decategorialization and recategorialization. The first

refers to the loss of properties of the original word class from which a grammatical morpheme comes. For example, a noun grammaticalizing to an adposition may lose the ability to be inflected for number, gender, or case, or the ability to be modified by an adjective or a classifier. A verb grammaticalizing to an aspect marker may lose the ability to take arguments and to inflect for certain verbal categories. When the origin of a construction is gestural, decategorialization cannot apply because the original form did not belong to any grammatical category in the first place. In other words, there are no grammatical features that a gesture could lose.

Recategorialization can be thought of as the positive counterpart of decategorialization. In the prototypical case where a lexeme becomes a grammatical marker, the element not only loses in categoriality but also gains new properties due to its use in the new grammatical function. Often a new category is created this way, for example, a category of conjunctions, or adpositions, or determiners. The grammaticalized items are then assigned to the new category and have their own particular properties that they did not have before. Whereas this process involves the creation of a new linguistic category from another linguistic category, the grammaticalization of gesture is different. It essentially involves the creation of a linguistic category from a nonlinguistic structure, because gesture does not belong to any linguistic category in the usual sense of the word. Consequently, the process of category formation has a different character in the case of such constructions.

Another effect of grammaticalization that is inapplicable in the case of a nonlinguistic source is divergence. This happens when the source of a grammaticalized form is retained alongside the grammatical marker. If, for instance, the grammaticalization leads from an independent word to an affix, the result is two related forms, one that still functions as a full lexical item, and the other that functions as a grammatical marker affixed to its host. The two forms can then develop in different directions, so as to become more and more dissimilar, and this is called divergence. As far as gestural sources of sign language constructions are concerned, the original form cannot undergo any independent linguistic development because it is not a linguistic form. Although gestural elements can and do persist in sign language (cf. the discussion on persistence and on layering above), divergence is not involved.

If all of these factors are taken together, it becomes clear that the grammaticalization of constructions that are simultaneous and derive from a gestural source is significantly different in nature from the better known grammaticalization processes in spoken languages. A number of the parameters of grammaticalization theory need to be reinterpreted or are inapplicable altogether. It will be worthwhile to look at the grammaticalization of gesture (and of facial expressions) more closely in the future. The continuing search for significant differences between the signed and the spoken language modalities could hit on a fruitful domain here.

Lexicalization

Lexicalization can be seen as a process that is the reverse of, or complementary to grammaticalization. Whereas a typical grammaticalization path creates grammatical categories out of lexical material, lexicalization involves the creation of conventional lexemes out of constructions. However, by contrast with the extensive evidence for grammaticalization, it seems to be less straightforward to determine just how frequent lexicalization is in language and to pin down the exact nature of lexicalization processes. Hopper and Traugott (1993) described lexicalization, the "process whereby a non-lexical form … becomes a fully referential item," as "relatively uncommon" (p. 49). On the other hand, Cabrera (1998) seemed to employ a some-

what wider notion of lexicalization as a process that "proceeds from syntax towards the lexicon" and is "very common" (p. 217). The interaction between grammaticalization and lexicalization can be conceived of in the following way:

> In language change there is a constant movement from the lexicon to the syntax and the other way round. We do not observe languages gradually losing their lexicon and enriching their morphology and syntax. Nor do we observe languages gradually increasing their lexicon and losing their morphology and syntax. This means that language evolution is not exclusively a process of grammaticalization or lexicalization. Only the interaction of the two processes can produce the balanced results we observe in language evolution. (Cabrera, 1998, p. 224)

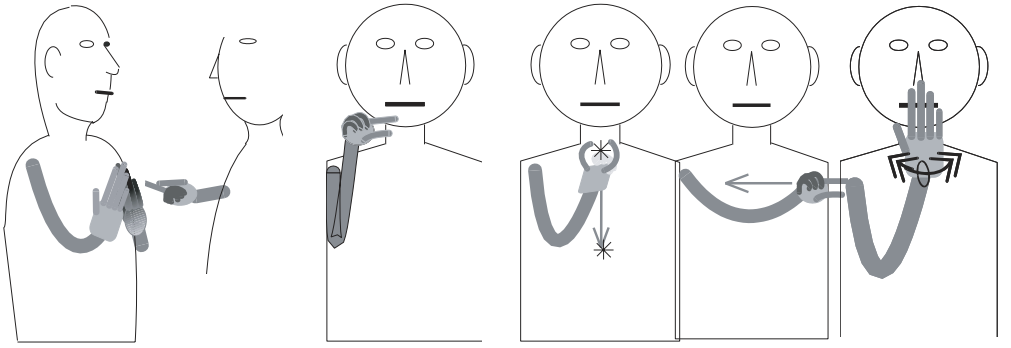
A similar view is expressed in Ramat (1992), using the term 'degrammaticalization' instead. The "flux between lexicon and grammar" seems to be due to two competing motivations, "the least-effort principle, leading to opaque labels, and the transparency principle, which strives toward an optimal one-to-one relation between form and function" (p. 549). Grammatical constructions are transparent because they can be analysed into their components, but they place a higher processing load on the speaker. Lexemes, on the other hand, can be easily retrieved as a whole but place a higher load on the memory.

With respect to all three constructions described here, there is no doubt that lexicalization is extremely common and productive. In this section, I discuss some characteristics of these lexicalization processes and relate them to the structure of the IPSL lexicon as a whole.

Both grammaticalization and lexicalization should be thought of as continuous processes that progress gradually over time. This means that just as we find instances of incomplete grammaticalization, it is also natural to expect cases of semi-lexicalization, in fact an entire continuum of more or less lexicalized forms. This is exactly what we find in geometrical shape constructions, movement/location constructions, and 'handling' constructions in IPSL. However, in order to describe this lexicalization scale in a satisfactory way, we need to posit parameters of lexicalization, parallel to the parameters of grammaticalization in the previous section, and look at where each item is located with respect to these parameters.

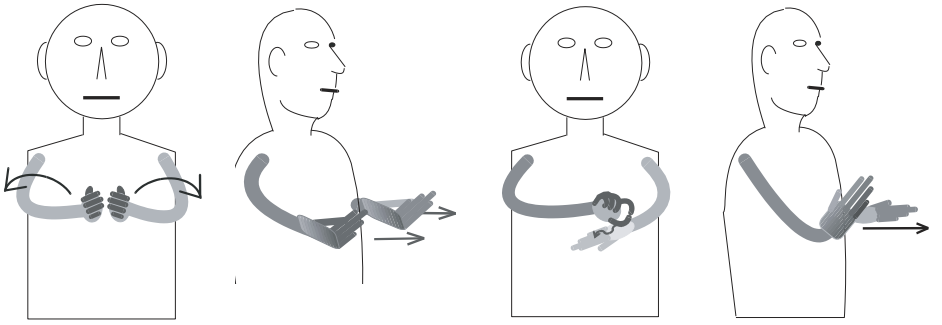
In order to decide which items to include in a dictionary, lexicographers need to use some criteria or other for the degree of lexicalization, even if those are not always explicitly stated. However, it is much more difficult to abstract away from more pragmatic considerations and arrive at a set of criteria that can be used to deal theoretically with the lexicalization continuum. Pawley (1986) listed some criteria to identify lexemes in a lexicographer's sense. However, most of the criteria are not applicable to simultaneous constructions of the kind found in signed languages because they refer to a sequence of elements, such as the question of whether internal pauses are possible within a putative lexeme, or whether constituents of a putative lexeme can be separated. From a sign language point of view, Johnston and Schembri (1999) presented some useful criteria that are applicable to the kind of largely simultaneous constructions under discussion here. They distinguish between 'lexemes' and '(productive) signs', a distinction that corresponds to a high versus a low degree of lexicalization on the lexicalization continuum. The discussion below draws on some of the criteria mentioned by Johnston and Schembri (1999), illustrated with examples from IPSL. However, it is important to remember that all aspects of lexicalization discussed below are conceived of as dynamic processes and that their applicability to any particular item is a matter of degree.

The basic lexicalization process appears to be the same in geometrical shape constructions, movement/location constructions, and 'handling' constructions. Initially, a form that describes



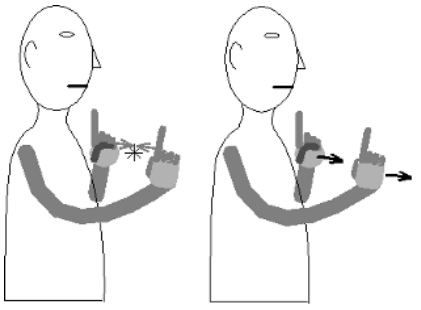
8.1: HOUSE 8.2: RICE 8.3: LITTLE 8.4: TIE 8.5: SENTENCE 8.6: MIRROR

FIG. 6.8. Signs based on geometrical shapes.



9.1: NEWSPAPER 9.2: GIFT 9.3: WRITE 9.4: APPLICATION

FIG. 6.9. Signs based on 'handling' constructions.



10.1: MEET 10.2: FOLLOW

FIG. 6.10. Signs based on movement/location constructions.

a certain object or situation for which there is no conventional lexical sign is freely coined. When an originally descriptive form is regularly used for a certain object or situation, it may become a conventional lexical sign. Figs. 6.8 through 6.10 show some examples of lexicalization from the three source constructions.

The first set of criteria concern formational (or phonological) aspects of the sign. With increasing lexicalization, the form of an originally freely coined expression becomes fixed and formal variation is eliminated. Eventually, there will only be one form of the lexical sign that is invariable in all its formational aspects. For example, a description of a house in terms of its geometrical shape may have various realizations. A signer may use several signs to describe the walls, the roof, the door, and windows, with varying degrees of precision. The lexical sign HOUSE (Fig. 6.8.1), on the other hand, is always produced in the same way. It may be modified by an additional descriptive construction, but by itself, it is always a single sign. Moreover, the form of the sign is quite independent of the actual shape of a house, that is, the sign does not only refer to houses with triangle-shaped roofs, but to any kind of house. In fact, roofs in the region are typically flat.

Another formational aspect is the question of whether changes in the formation of a sign result in changes in meaning. If a mirror is described in terms of its geometrical properties, as in example (4), formational changes produce different meanings. For example, the square shape can be larger or smaller, and the signs can be made closer to the signer's body or further away. In each case, a different kind of mirror is described in a different position relative to the signer. In the lexicalized sign MIRROR (Fig. 6.8.6), on the other hand, it does not make any difference whether the hand is held somewhat closer to or farther away from the face, or whether the wrist twists once or several times, or whether the hand is completely upright or not. Since the meaning in a lexicalized sign is noncompositional, changes in formational aspects of the sign are not individually meaningful.

Semantic criteria are perhaps the most useful in determining the degree of lexicalization of a sign, although they can themselves be somewhat elusive. In a freely coined construction, the meaning is compositional, with all parts of the sign contributing their own meaning. With increasing lexicalization, the semantic compositionality is lost and the sign is not analyzed into its components any more. The meaning of a lexicalized sign typically transcends its original compositional meaning. This can be observed in the examples in various ways. The sign GIFT (Fig. 6.9.2), for example, means 'a gift' or 'give a gift' regardless of the actual shape of the object given. The handshape does not stand for a particular type of object any more and does not contribute independent meaning. The sign MEET (Fig. 6.10.1) has an original literal meaning of 'two people coming together'. However, as a lexicalized sign, the meaning does not necessarily involve two individuals. Rather, the sign may refer to any number of people or groups of people meeting. The twist of the wrist in the sign MIRROR (Fig. 6.8.6) originates in an imitation of the movement of the mirror caused by the person holding it, which actually adds an element of 'handling' to the geometrical shape basis of the sign. However, in the lexicalized sign the movement does not have its literal meaning, that is, the sign does not mean 'holding a mirror and twisting it', it simply refers to the object. The sign NEWSPAPER (Fig. 6.9.1) is based on a 'handling' construction with a literal meaning that suggests the unfolding of a large flexible object. With the same or a different orientation and place of articulation, the sign might refer to a blanket, a table cloth, or a curtain. However, lexicalization has narrowed down the meaning to refer to a newspaper in particular, and not to any of the other objects. Although the literal meaning may still be there in the background, in its everyday use, the sign is basically

noncompositional in meaning. When the sign is made in isolation, signers will translate it as 'newspaper' and not in its literal sense.

Finally, the grammatical characteristics of a sign may also change with increasing lexicalization. A sign may lose grammatical properties associated with the source construction and may gain other characteristics as a result of its lexicalization. The two signs in Fig. 6.10 are derived from a movement/location construction using the 'person' classifier handshape. In the productive classificatory construction, the handshape can change to incorporate information about the number of referents (cf. Fig. 6.5.6 above), and the movement of each hand is individually meaningful. However, in the lexicalized signs, the handshapes and movements do not change to indicate more precise meanings such as 'one person quickly following another on a zig-zag path' or 'two individuals moving downward slowly to approach each other'. To express such meanings, a 'legs' construction would be used in IPSL.

An example of signs acquiring new grammatical properties involves productive 'handling' constructions in IPSL. These usually occur in the predicate slot, with the meaning of 'handling a particular object in a particular way'. However, many lexicalized signs based on these productive 'handling' constructions may equally well occur as arguments in the sentence. Often they are actually ambiguous between a referential and a predicative meaning, such as 'gift' and 'give a gift' (Fig. 6.9.2), 'application' and 'submit and application' (Fig. 6.9.4). These signs have acquired greater syntactic freedom as a result of lexicalization.

Due to the lexicalization continuum, some signs show evidence of being halfway in between a freely coined form and a completely lexicalized form. The concept of persistence that was discussed in the grammaticalization section of this chapter is useful here as well. Often, aspects of the original freely coined expression will persist and continue to characterize a semi-lexicalized form. Although entirely natural and expected in the kind of framework presented here, semi-lexicalization is a huge problem for sign language lexicographers. Konrad (1999) has addressed some of the related problems with regard to German Sign Language, and Johnston and Schembri (1999) presented a detailed discussion of problems around the notion of "lexeme" in Australian Sign Language (Auslan). Because the issue here is not to practically decide what to include in a sign language dictionary, I just describe the kinds of in-between cases found in the IPSL lexicon, with the understanding that this is only part of understanding, not solving, practical lexicographical problems.

Some signs are neither entirely fixed in their form nor are they entirely new coinages. Rather, they fall somewhere in between the two extremes, allowing some variation to their form. For example, the sign WRITE (Fig. 6.9.3) may be signed with or without a passive flat hand on which the active hand 'writes', the flat hand and the movement of the active hand may be oriented vertically rather than horizontally, and different handshapes are possible as long as they convey the image of 'holding a pen-like object'. Semantic criteria are also a matter of degree. The meaning of a sign is less specified and closer to its original literal meaning in some cases than in others. Whereas TIE (Fig. 6.8.4) is a well-defined object, the sign glossed as SENTENCE (Fig. 6.8.5) can actually refer to any line of written text, translating as 'subtitle', 'headline', 'label', etc., as well as to the abstract concept of a sentence, for example, in talking about a sentence in the signed language. The length of the movement and the place of articulation may vary according to the context and the particular meaning. Lexicalization is less complete in this case than in a sign such as TIE.

Further evidence for the lexicalization continuum comes from the fact that some signs may be used both as lexicalized and as freely coined forms. The sign labeled RICE (Fig. 6.8.2) may also

be used to refer to any small entity with a similar shape, for example lentils or gems. LITTLE (Fig. 6.8.3) is a lexical sign meaning 'a little bit', 'a small quantity of', but on another level of the lexicon, the same sign formation can be used freely to refer to any object of a small rectangular shape. Although the lexicalized meaning, the word *kam* 'a little bit' in Hindi/Urdu, is given as a translation of the isolated sign, the meaning as a geometrical shape sign is always possible and frequently used in context.

The continuum of lexicalization seems to be similar in nature to a lexicalization process in Iroquoian languages. The phenomenon here has been termed 'Conventionalized Verb Forms' (CVFs) by Sasse (1999). Morphologically complex inflected verb forms acquire new meanings that go beyond the immediate morphological constituents. The forms then become ambiguous between their literal compositional reading and the new noncompositional reading (e.g., Sasse 1999, from Cayuga):

(5) te-ká:-the
DUALIC-it-fly:off:HABITUAL

1. 'it habitually flies off'
2. 'plane'

(6) t-kat-í'tro'
there-they(neuter)-live:stative

1. 'the animals live there'
2. 'stable'

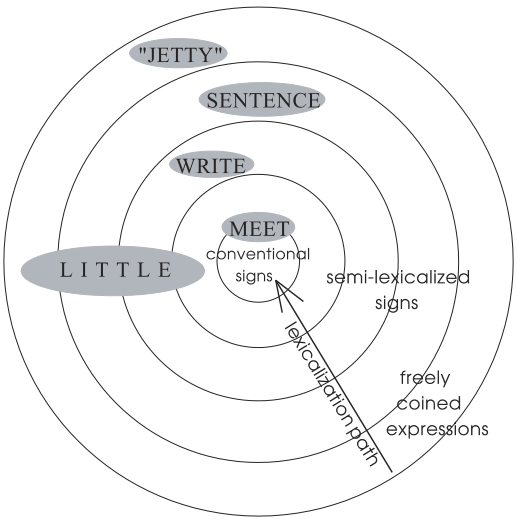
Like the lexicalized forms we have seen in IPSL, the forms in (5) and (6) are *descriptive* complex forms. In IPSL, the description is principally in terms of visual-spatial properties, whereas in Cayuga the descriptions can be based on any suitable "word-sentence". In both IPSL and Cayuga the complex productive forms may be ambiguous between a lexicalized and a compositional reading (cf. the example LITTLE discussed above), and in both cases this process is highly productive for creating new lexical items. As lexicalization progresses, the compositional reading becomes less dominant and speakers/signers do not usually think of the lexicalized word/sign in terms of its literal meaning, although they may be able to reconstruct it under certain conditions, for example in an elicitation situation, or to use the underlying literal reading in creative or poetic types of signing.

I described lexicalization as a gradual process here, but it is important to note that this is only true with respect to the part of the lexicon that is relatively stable over time. On the other hand, when a new term is needed for the immediate purpose of an ongoing conversation, signers often instantly coin novel expressions. Klima and Bellugi (1979, p. 16f) gave examples of lexicalization that happens within one and the same discourse in ASL. Signers first expressed the new concept of a straitjacket, for which there was no conventional lexical sign in ASL, by an elaborate circumlocution involving classifiers and geometrical shape descriptions. The freely coined construction was then instantly reduced to a single sign within one and the same discourse. Similarly, in one IPSL text, the signer is describing a scene with a jetty on a lake. Since there is no conventional sign for 'jetty' in IPSL, the signer produces a visual-spatial description involving geometrical shape signs and a 'legs' construction, represented in Fig. 6.4.1. In this kind of situa-

tion, the novel sign or sequence of signs may or may not ever be used again with this meaning. Although this kind of immediate coinage of new terms is very important in IPSL, the focus here is on the structure of the lexicon that is relatively stable over time and is subject to gradual lexicalization processes as described above.

To sum up the results from this section, what do these lexicalization processes entail for the structure of the IPSL lexicon as a whole? And what are the consequences for IPSL as a communication system? Originally, there are no conventional lexical items in IPSL in the semantic domains of handling and movement/location. Rather, there are highly productive combinations of handshape and movement components that translate into verbs such as 'put', 'walk', 'jump', and so on. It is only when some of these combinations subsequently become lexicalized that such lexemes appear in the IPSL lexicon, and this is a gradual process that allows for in-between cases. Moreover, a very large number of objects do not have conventional lexical signs to refer to them. Rather, it is normal in IPSL to talk about objects in terms of their visual-spatial properties. With respect to other sign languages (e.g,. McDonald, 1982, for ASL), it has been claimed that a large percentage of all lexical signs originate in the classifier system. This point of view seems to assume a pathway leading from a grammaticalized construction to a lexeme via processes of lexicalization such as the ones discussed above. However, the IPSL case throws a slightly different light on this process because lexicalization can proceed from rather gesture-like, only weakly grammaticalized forms in the case of 'handling' constructions. That is, it is not necessary for lexicalization to "wait" until the grammaticalization process has been completed. Rather, it seems to be possible to create lexemes directly out of the more gesture-like precursor to classificatory constructions. This observation may be of theoretical importance as far as the interrelationship between grammaticalization and lexicalization is concerned.

The structure of the IPSL lexicon, with a core of fully lexicalized signs and multiple layers of semi-lexicalized and freely coined signs and sign combinations, is represented schematically in Fig. 6.11. The consequence of the structure of such a lexicon is of course that IPSL is a highly context dependent language. Only in a particular context will it become clear what the signer is



FiIG 6.11. Structure of the IPSL lexicon.

talking about. Examples (3) and (4) on pp. 114–115 have demonstrated this mechanism. Since IPSL is a face-to-face communication system for practically all purposes, it is quite natural that it should be highly context-dependent. In a face-to-face situation, signer and addressee share enough context to be able to communicate effectively with the kind of lexicon that is characteristic of IPSL. It will be interesting to see what developments may follow if IPSL signers get involved with new communicative possibilities to a significant extent. "Long-distance" communication via television, video telephone, and sign writing systems may have a significant impact on the structure of IPSL in the future.

CONCLUSION

To return once more to the notion of classification, an important conclusion emerging from the discussion of the data presented in this chapter is that even though constructions may look similar to each other on the surface, they may in fact not have the same status. Therefore, language-internal criteria must be used in every case to decide in how far the term 'classification' is appropriate.

One significant difference between constructions such as the ones discussed in this chapter, both within and across sign languages, involves their degree of grammaticalization from a gestural source. In addition to making sense of such differences, the grammaticalization framework presented here is intended to bridge the gap between the more recent view of these constructions in partly gestural terms (as represented by Liddell's chap. 9 contribution to this volume) and a point of view that accounts for the constructions in purely morphosyntactic terms (as represented by the more traditional approaches, such as Supalla, 1986). Good evidence can be presented for both gestural and morphosyntactic elements within these constructions, and there is no need to entirely commit oneself to either one or the other approach. On the contrary, within a diachronic model of grammaticalization, it is entirely natural that a construction should have both gestural and morphosyntactic characteristics.

Finally, recognizing the gradually shifting character of languages and the nature of grammaticalization and lexicalization processes, we can now shed light on notoriously difficult domains of sign language structure, such as the lexicographic problems associated with semi-lexicalized forms and the existence of hybrid forms resulting from incomplete grammaticalization.

ENDNOTES

[1]This was due to the fieldwork situation in India and Pakistan. The informants had no background or training in linguistics and were unanimously convinced that their sign language had no "grammar" at all. Given that it was doubtful whether the informants would have understood the significance of grammaticality judgments, and whether their responses could have been interpreted in a sensible way, this technique was not used during fieldwork.

[2]The quotes with the terms 'classification' and 'classificatory' in this chapter (and in the title) indicate that the terms are not really applicable to all constructions discussed.

[3]The label 'person' is used for convenience here. In fact, this form can also apply to animals, even though it is more typically used for humans. 'Person' conceptualizes the referent as a whole, whereas 'legs' implies reference to a particular body part.

[4]Numerical incorporation is a process by which the number of entities is indicated by a number handshape fused with the sign denoting the entity. For example, the sign for 'year' made with a handshape with three extended fingers means 'three years'.

[5]In Zeshan (2000a), I had not even described classificatory constructions because in my earlier data, mostly of the 'casual conversation' type, they hardly occurred at all.

[6]FLOWER is made with the hand held under the nose in a 'flat O' handshape (with all fingers and the thumb touching at the finger tips) and the finger tips facing up, then the hand moves slightly upward and the fingers open to a loose '5' handshape.

[7]Note that classifiers in spoken Thai are independent words, not bound morphemes, and are thus not entirely comparable to sign language classifiers. However, the comparison here is based on function rather than form.

[8]In the discussion of grammaticalization and its various subparameters, I mainly draw on work by Heine, Claudi and Hünnemeyer (1991), Hopper and Traugott (1993), Lehmann (1995), and Ramat and Hopper (1998).

[9]This process is not mentioned in any of the sources cited at the beginning of this section and could be subsumed under other parameters. I have, however, singled it out here because it applies particularly well to this case of grammaticalization.

[10]This is an oversimplification. In actual fact, there is considerable overlap between two cycles, so that more grammaticalized and less grammaticalized forms co-exist. See also the discussion on layering.

[11]I take gesture to be nonlinguistic in a strict sense here, leaving aside the fact that gesture does of course have a communicative function and interacts in complex ways with linguistic structures proper.

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7

Verbs of Motion and Location in Hong Kong Sign Language: Conflation and Lexicalization

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This chapter presents some preliminary results of a research project that investigate the inherent semantic characteristics of the classifier predicates of Hong Kong Sign Language (HKSL). The analysis is based on Talmy's (1985,2000) concept of motion events and how certain fundamental semantic categories of a motion event are incorporated into the predicates of natural language. Talmy argued that a motion event can be analyzed as having four basic semantic categories: *FIGURE, MOTION, PATH, GROUND*. This event is also said to be associated with an external co-event that consists of semantic categories such as *MANNER* and *CAUSE*. Languages display differences in mapping these categories onto the surface constructions. This chapter examines the lexicalization process in verbs of motion and location in HKSL, with particular reference to how the four semantic categories and the co-event *MANNER* are mapped onto these verbs. The paper argues that HKSL can be regarded as a *FIGURE*-type language because *MOTION* and *FIGURE* are consistently conflated in the morphological derivation of the classifier predicate.

STRUCTURE OF A MOTION EVENT

Talmy (1985, 2000) argued that the human mind is endowed with certain cognitive processes that enable us to draw a boundary over a portion of our perception and ascribe to the content within that boundary the property of being a single entity. He calls these processes *conceptual partition* and *ascription of entityhood* respectively. One of these entities can be cognized as a macroevent. The macroevent may be expressed by a single clause and is regularly conceptualized as a unitary event. An example in English is shown in 1:

(1) The rock rolled down the hill. (Taken from Talmy, 1985, p. 63)

However, a closer analysis of this single clause reveals that this macroevent can be treated as an event complex that is decomposable into two subcomponents. First, there is a framing/main event that provides an overall conceptual framework within which certain activities are conceived of as taking place. This framing event, which is said to constitute a particular event schema, also contributes to the argument structure of the event predicate and the semantic characteristics of the arguments within it. The theme argument, 'the rock,' in example (1) is perceived as changing its location from point a to point b in a motion event. Second, the framing event may be substantiated or supported by certain co-events. The co-event for (1) is *MANNER*,[1] which is expressed in the form of 'rolling'. According to Talmy, the framing event can be applied to different conceptual domains. In this chapter, we concentrate on the domain of motion and location in space.[2]

Talmy (2000) defined a motion event as a situation containing movement or the continuation of a stationary location of a figural entity. Motion as an event entity is perceived as having the fundamental property of *dynamism*, which is a principle of activeness in the world and universal in human cognition. A motion event consists of four semantic categories: *FIGURE* (figural entity), *GROUND* (ground entity), *MOTION* (activating process) and *PATH* (association function). This framing event may be supported by co-events such as *MANNER*.[3] According to Talmy (2000), a *FIGURE* is a moving or conceptually movable objects whose path or site is at issue. *MOTION* refers to the presence per se of motion or locatedness in the event, technically reanalyzed as abstract deep verbs *MOVE* or BE_L (i.e., 'be located'). The third component is *PATH*, which is defined as the *path* followed or the *site* occupied by the figural entity with respect to the ground entity. *PATH* is argued to constitute the core schema of the framing event; it has the association function of putting the figural entity into a particular relationship with the ground entity.[4] It signals directed motion or movement along a path. Lastly, *GROUND* refers to a reference frame, or a reference point; it is usually stationary and within which the figure's path or site is characterized. Conceptually speaking, *MOTION* is either translational or self-contained. *Translational motion* depicts a change of location of the figural entity in the time period under consideration. Translational motion reflects the semantic category of *PATH*, the core schema of a motion event. Self-contained motion is usually encoded as *MANNER* in the co-event. Examples of manner of motion are rotation, oscillation, dilation (contraction or expansion), wiggle, local wandering or rest.

According to Talmy, the existence of the macroevent as a cognitive unit with its specific conceptual structure may be universal of linguistic organization. Also, typologically, languages may be divided according to how this conceptual structure maps onto the surface constructions during the process of lexicalization. Hence, the world's languages can be broadly categorized as either verb-framed or satellite-framed languages, depending on whether the core schema of a macroevent is mapped onto the main verb or the satellite. Talmy (1985) defined a *satellite* as any grammatical constituent other than a nominal complement that is in a sister relation to the verb root. English or Cantonese are said to be satellite-framed languages because the core schema *PATH* is expressed not by the main verb but by the satellite to the verb:

(2) English PP: He walked[5] **toward the gate**.

(3) CantoneseV_2: keoi paau **gwo** heoi maai syut-gou sik
Pro run cross go buy ice cream eat
'He ran over there to buy an ice cream (to eat)'.

Where *PATH* is mapped upon the verb, a verb-framed language results. Spanish is an example.

(4) Spanish La botella **salio** de la cueva flotando
The bottle exit from the cave, floating
'The bottle floated out of the cave'. (Taken from Talmy, 1985, p. 69)

In a motion event, *MOTION* (*MOVE* or BE_L) always appears in the verb root and typologically it may be conflated with one of the following categories: *FIGURE*, *PATH* and co-event *MANNER* or other categories. Different languages show different conflation patterns in the process of lexicalization.[6] Based on this property, the world's languages can be categorized according to whether they characteristically place the co-event, the *PATH* or the *FIGURE* on the verb root. Spanish is a *PATH*-type language, English and Cantonese are *MANNER*-type languages, and Atsugewi is a *FIGURE*-type language, as shown in example (5) below:

(5) /´-w-uh-sʔaqʔ-ik·-ª/ (Taken from Talmy, 1985, p. 74)

In Atsugewi, -sʔaqʔ- is translated as 'runny icky material moves or be-located'. In this example, it means literally 'runny icky material is located on the ground from its own weight acting on it'. Note that English, Cantonese, and Atsugewi are categorized as *satellite-framed languages* because *PATH* is not mapped onto the man verb but the satellite to the verb. Typologically, *MOTION+PATH* is the most extensively represented among the world's languages, followed by *MOTION+CO-EVENT* and *MOTION+FIGURE* least so.

PREVIOUS ANALYSIS BASED ON THIS MODEL

Talmy's conceptual model of motion events has been employed in the analysis of verbs of motion and location in American Sign Language (ASL). These are intransitive verbs that involve a theme or an agentive argument as the grammatical subject. In signed language research, these verbs are represented in a form conventionally referred to as *classifier predicates* (Corazza, 1990; Schick, 1990).[7] Following the 'movement as roots' hypothesis proposed by Supalla (1986),[8] Schick (1990) investigated how the handshape morphemes combine with different movement roots in the predication and how this grammatical process reflects transitivity. In her analysis, the 'CLASS' morpheme involves a handshape that represents the *FIGURE*, and this handshape combines with the 'MOV' root, resulting in a 'path' movement in space, meaning an entity moving from point a to point b.

Talmy's approach has been adopted in the analysis of verbs of motion and location in some signed languages. Adopting this model, one needs to determine which semantic category the verb conflates with in the process of lexicalization. In this regard, different claims have been advanced. Supalla (1990) analyzed certain locomotion verbs like RUN, LIMP, and SWIM in ASL and argued that they surface in the form of serial verb constructions. With an English sentence, 'a human limping in a circle' (taken from Supalla, 1990, p. 133), he argued that ASL patterns English and codes *MANNER* in the main verb LIMP with a specific body classifier that allows the conflation of manner of locomotion. *PATH*, the core schema of the motion event, is mapped onto a reduced serial verb (i.e., satellite) that selects an unmarked classifier handshape. Adopting this analysis, he argued that ASL is a satellite-framed language because *PATH* is encoded in the "reduced" second verb of the verb series. In contrast, Slobin and Hoiting (1994) argued that ASL is a verb-framed language, similar to the Sign Language of the Netherlands (SLN). Treating each verb in the series as having the status of a full verb, they argued that *PATH* is still encoded by a

verb, not a satellite. As shown by the sentence in SLN, MAN HOUSE [RUN APPROACH ENTER] 'A man ran into a house'.[9] *MANNER* is encoded both by an independent verb RUN and inflectionally on two path verbs —APPROACH and ENTER—in the verb series. Generally speaking, both accounts adopt the 'movement as root' hypothesis but the difference seems to stem from whether a distinction is made between manner of locomotion and manner of motion along a path. Supalla (1990) argued that manner of locomotion is always mapped onto the locomotion verb that occurs as the first verb of the series and the path verb is not marked for manner of locomotion.[10] On the other hand, Slobin and Hoiting (1994) regarded both manner of locomotion and manner of motion along a path as the subcomponents of *MANNER*. They argued that *MANNER* (i.e., manner of motion along a path) is still inflected on the path verb of the verb series, albeit in a reduced form.

LEXICALIZATION: PROBLEMS AND CONCERNS

In order to analyze the lexicalization patterns of verbs of motion and location in signed language, one needs to tackle two fundamental issues. They are to do with the linguistic status of handshape as classifier, a category borrowed from the spoken language literature, and what constitutes the verb root of a classifier predicate.

There has been a controversy regarding drawing a parallel between the handshape in the so-called 'classifier predicates' in signed language with the spoken language classifiers. If one takes the definition that classifiers are separate morphemes that combine with the noun or the verb, the Athabaskan languages like Navajo or Koyukon with which signed language classifiers are often associated do not display this kind of morphological property. These spoken languages contain just suppletive classificatory verbs similar to the Atsugewi example illustrated above. In other words, these languages do not have a separate classifier morpheme as such. In contrast, the handshape of classifier predicates has its own distinctive properties. First, it is considered as a distinct but bound morpheme. Second, Engberg-Pedersen (1993) pointed out that the handshape seems to reflect more than just noun classification. The general finding that a human entity is associated with a number of handshapes indicates that the handshape reflects not only the inherent semantic characteristics of humanness; certain constraints seem to be at work in the choice of a handshape for semantic representation. In the following analysis, we show that these constraints may be related to specific aspects of human involvement in a motion event.

The second issue is more difficult to resolve: it is concerned with what counts as the verb root of a classifier predicate. This issue has been subject to debate recently and different positions have been advanced: (a) movement as root (Supalla, 1986, 1990; Schick, 1990; Liddell & Johnson, 1987) and (b) handshape as root (McDonald, 1982; Engberg-Pedersen, 1993). Supalla (1982) argued that the handshape is regarded as a bound morpheme that combines with the movement root during the process of morphological derivation. Engberg-Pedersen argued against the adequacy of associating handshapes with the spoken language classifiers or treating one component of the classifier predicate as more basic than the other. According to her, both components are mutually interdependent in generating the predicative meaning. Schembri (chap. 1, this volume) also argued on semantic and morphosyntactic grounds that the handshape of a classifier predicate displays distinct properties that are not strictly comparable to a spoken language classifier.

It appears that it is the modality in which signed language operates that leads to the difficulty in analyzing the morphosyntactic structure of classifier predicates. Talmy's analysis is largely

one based on spoken languages, and the lexicalization patterns are analyzed with the assumption that semantic categories like *FIGURE* or *PATH* can be mapped onto the grammatical constituents in a sequential order. In signed language, the two fundamental components—handshape and movement—are presented more or less simultaneously rather than sequentially. However, we argue that simultaneity in surface representation should not lure us into thinking that these two components cannot be analyzed independently. It is reasonable to assume that the four semantic categories suggested by Talmy are primitives that underlie the conceptual structure of motion events. The question is whether differences exist in the lexicalization patterns between signed and spoken languages.

LEXICALIZATION IN VERBS OF MOTION AND LOCATION: A PROPOSAL

In this chapter, we attempt to tackle this problem from a cognitive semantic perspective. We assume that movement is the verb root and fundamental to a systematic account of verbs of motion and location in signed language. A *predicate* by definition denotes a state, an event, or a process. In a predicate, it is the verb that selects the arguments and assigns the appropriate semantic and syntactic properties to them (Williams, 1994). For an event that involves causation, the verb selects an agent as its external argument and an affected patient as its internal argument. For a motion event, the verb selects a single external argument as the grammatical subject. Adopting this assumption in the analysis of verbs of motion and location in signed language, the movement of the manual articulator is crucial, for it provides important information about some fundamental qualitative domains of predication such as event and action, state or location.

Following Talmy's analysis, the conceptual structure of a motion event in signed language may consist of two separate components: the *FIGURE* component and the *GROUND* component (see Diagram 1 below). The *FIGURE* and *GROUND* components are usually realized by the dominant and nondominant hand respectively. If the *GROUND* component is present, it may represent an independent conceptual component of the motion event as a consequence of the argument structure invoked by the verb. In a motion event, the argument for *GROUND* may assume the semantic role of location, source or goal.

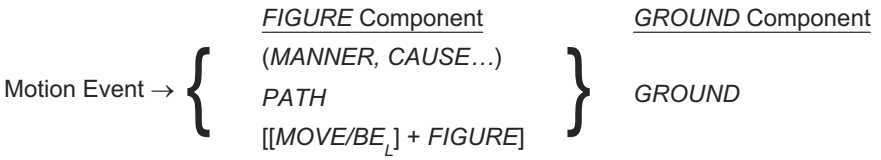


Diagram 1. Conceptual structure of a motion event in signed language

In the *FIGURE* component, *MOTION* expressed in the form of *MOVE/BE*$_L$[11] forms the basic level of the lexicalization process. It is regarded as an abstract deep morpheme according to Talmy's analysis. For verbs of motion and location, *MOTION* is realized phonetically through movement of the dominant hand. Those verbs that encompass an underlying *MOVE* encode a displacement of an entity through space. Verbs with *BE*$_L$ indicate the existence or location of an entity in space. In verbs of motion and location, the movement that encodes either *MOVE* or *BE*$_L$

consistently combines with the handshape unit of the predicate. The handshape unit typically encodes *FIGURE* of the motion event structure.

Once [[*MOVE/BE*$_L$] + *FIGURE*] forms the first abstract tier of the predicate, other semantic categories like *PATH* and/or *MANNER* may be added to this tier. While *MANNER* or other co-events are optional, *PATH* is obligatory because it represents the core schema of a motion event structure. [*BE*$_L$ + *FIGURE*] combines with *PATH*$_s$ (site) and surfaces as verbs of existence/location. It may further combine with *MANNER* to denote spatial configuration. [*MOVE* + *FIGURE*] combines with *PATH*$_p$ (path) and surfaces as verbs of translational motion. This is motion in which the location of the *FIGURE* changes during the process. It may combine further with *MANNER* to denote manner of motion along a path.

This proposal assumes that [*MOVE/BE*$_L$] is a deep morpheme and [[*MOVE/BE*$_L$] + *FIGURE*] is a midlevel constituent. Note that these deep or midlevel morphemes are conceptual units that reflect the semantic organization of natural language. They do not have a corresponding overt morpheme at the morphosyntactic level. However, they select a verb from the lexicon that represents the motion event structure in overt syntax. Depending on the perceived motion event, verbs like 'go', 'cross' or 'pass' in English are assumed to have an underlying abstract morpheme MOVE in the semantic representation. Talmy (2000) also suggested the possibility of certain abstract intermediate morphemes for a conceptual complex that consists of a deep morphemic concept together with additional semantic materials. Seen in this light, signed language should be a kind of figure-type language because *MOTION* is consistently conflated with *FIGURE* to form a verb stem in the classifier predicate. This explains why the predicative meaning is always a function of the interaction between *MOTION* and *FIGURE*. This interaction is expressed in terms of the co-occurrence restrictions between *MOTION* and *FIGURE*. These restrictions are partly semantic because the choice of handshape is dependent in part on the noun category of the referent. At the same time, the choice may reflect the specific aspects of the motion event on which the signer wishes to focus.

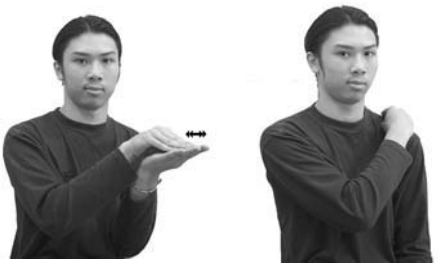
MOTION EVENTS IN HKSL

Some General Observations

In the analysis that follows, we examine the lexicalization patterns of the semantic categories in verbs of motion and location in HKSL. We restrict our analysis to the motion events that incorporate the co-event *MANNER*.

There has not been any official documentation on the origin of HKSL. From the sources provided by the deaf associations, HKSL is said to be historically related to a variety of Chinese Sign Language based in Shanghai. Woodward (1993) reported that HKSL and Shanghai Sign Language share 77% of the cognates in common. In the current project, the data were collected from three native deaf signers of HKSL through a picture elicitation task. They were shown a series of pictures and were told to describe them as accurately as possible. All the tokens were videotaped and transcribed with the help of a deaf research assistant.

Generally speaking, the *FIGURE* and *GROUND* of a motion event in HKSL are usually encoded by a set of classificatory handshapes. When the signer himself assumes the *GROUND* component, the body of the signer or part thereof becomes the locus or the reference frame with respect to which a *FIGURE*'s *MOTION* is characterized, as shown in example (6) below:



MOUSE CL-predicate

FIG. 7.1. A mouse lies on my shoulder.

(6) MOUSE CL: AN_ ENTITY_ WITH_ A_ BODY_ LONGER_ THAN_ IT_ IS_ WIDE_LIE_FACE_ DOWN_ON_ MY_ SHOULDER
FIGURE{[BE$_L$ + FIGURE$_i$] + PATH$_s$+MANNER} GROUND[12]

'A mouse lies on my shoulder.' (see Fig.7.1)

In example (6), the abstract verb *BE$_L$* combines first with *FIGURE*. In HKSL, the B-handshape with the thumb in contact with the pad of the fingers is used to refer to mice or entities with a curved back (see Fig. 7.1 for the handshape configuration). The complex then surfaces in a movement denoting an underlying *PATH$_S$* component. In HKSL, this involves a downward movement of the manual articulator that ends in a hold, which is equivalent to the contact root as discussed in the ASL literature. It encodes a stative predicate of existence/location of an entity in space. This realization is supported by a co-event *MANNER* realized by a downward palm orientation in the movement process. The sequence may also be translated as 'A mouse is located on my shoulder, lying face down'. This analysis shows that it is not movement per se, but movement together with a handshape in a specific orientation of the palm that bring about the meaning of 'lie', which is a verb of spatial configuration.

Also, *GROUND* usually occurs before *FIGURE* in a motion event, in line with the observation in Schick (1990) and Supalla (1990) that there is a tendency for *GROUND* to occur right after the antecedent, as shown in example (7):

(7) TREE CL: A_VERTICAL_OBJECT_WITH_EXTENSIONS_ON_TOP_BE-LOCATED-AT,
FIGURE {[BE$_L$ + FIGURE$_i$] + PATH$_S$ }→ GROUND$_i$

'A tree is located here'.

BIRD CL: A_ LEGGED_ENTITY_STAND_ BY_ CLUTCHING_ BRANCH_ OF_ TREE_ WITH_ CLAWS
FIGURE {[BE$_L$ + FIGURE$_j$] + PATH$_S$+ MANNER} GROUND$_i$

'A bird perches on the tree'. (Fig. 7.2)

In HKSL, the classifier for trees is the signer's forearm with a bent 5-handshape (see Fig. 7.2). Similar to ASL, the locative-existential predicate is realized by a downward movement ending in a hold in space. Note that the tree as a figural entity becomes the ground entity in a subsequent

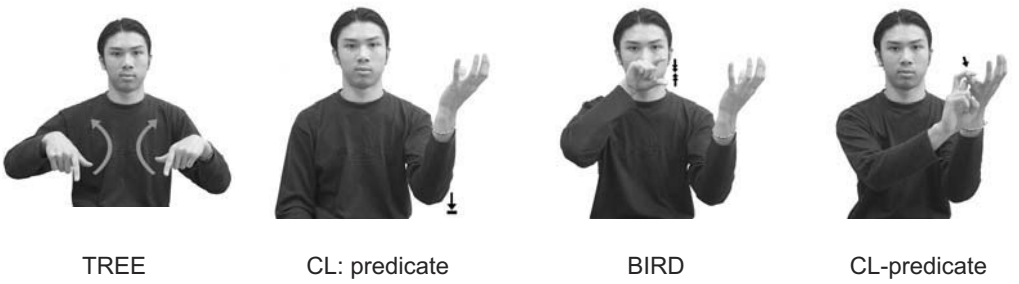


FIG. 7.2. A bird perches on the tree.

discourse, to serve as a reference point for the following figural entity to establish a relation with. It seems that in this kind of predicate construction, information about the location or the reference point with respect to which the *FIGURE* acts upon is foregrounded first and subsequently shifted to the background when the *FIGURE* is introduced into the discourse. Note that the verb 'perch' implies standing by clutching the branch of a tree with the claws of an entity. This requires a handshape that refers to an animate and legged entity. In HKSL, this quality in predication is realized by a V-handshape.

Nevertheless, it is not obligatory that *GROUND* precedes *FIGURE*. Variation was observed within and between the signers. Such variation may be explained by discourse factors to be discussed below.

BE_L - Predicates

[BE_L + FIGURE] and MANNER

Whole Entity. The motion events as represented by the BE_L predicates typically consist of a main event of existence/location and a co-event of manner. Verbs in HKSL that fall into this category such as STAND, LEAN, LIE, and SIT are conventionally called *posture verbs*. As suggested by Levin (1993), they are verbs of existence that specify the spatial configuration of an entity with respect to some location. BE_L as an abstract verb would surface as a downward movement morpheme that encodes the existence and location of the figural entity in space. *GROUND* is expressed through the nondominant hand and it refers to either animate or inanimate entities.

MANNER as a co-event in HKSL is represented by a specific palm and/or finger orientation that occurs simultaneously with the downward movement. In the data, the Y-handshape generally refers to an animate whole entity. In the human category, the sign STAND is represented by a vertical Y-handshape with a contralateral palm orientation (Fig. 7.3). This is taken to be the unmarked form to refer to a human whole entity. The hand configuration of SIT is almost the same except that the pinky finger is pointing out instead of pointing down.[13] LIE requires the palm to orient downward, and it generally means TO_ LIE_ ON_ ONE'S_ SIDE (Fig. 7.4). This configuration is considered as a citation form for LIE in HKSL. Specific lying postures again are depicted by palm orientation. TO_ LIE_ ON_ ONE'S_ BACK requires the palm to face outward and the selected fingers upward (Fig. 7.5). TO_ LIE_ ON_ ONE'S_ STOMACH (Fig. 7.6) re-

quires the palm to face inward and the selected fingers downward. Another example is LEAN. The sign articulation implies a posture which involves standing but with the upper part of the body leaning against an object, as shown in example (8):

(8) TREE CL: A_VERTICAL_OBJECT_ WITH_EXTENSIONS_ON_TOP_ BE- LOCATED-AT,
FIGURE $\{[BE_L + FIGURE_i] + PATH_S\} \rightarrow GROUND_i$

'A tree is located here'.

MALE CL: A_ HUMAN_ WHOLE_ ENTITY_ LEAN_ AGAINST_ A_ VERTICAL_OBJECT_WITH_ EXTENSIONS_ ON_ TOP
FIGURE $\{[BE_L + FIGURE_j] + PATH_S + MANNER\}$ $GROUND_i$

'A man leans against the tree'. (Fig. 7.7)

The Y-handshape is also associated with other animate entities such as birds or animals, but it differs from the human Y-handshape by palm orientation. Legged animals represented by the Y-handshape usually select a downward palm orientation due to our perception that the spatial configuration of animals is usually longer than it is wide. In sum, all the animate examples above combine BE_L with the same handshape and it is the palm and finger orientation that differentiates the noun category and manner of existence. The findings are in line with Engberg-Pedersen's (1993) suggestion that the verb stem in Danish Sign Language entails two semantic components: a classificatory handshape that "ascribes an argument of the verb to a certain noun class, and a predica-

FIG. 7.3. STAND.

FIG. 7.4. LIE_ON_ ONE'S_ SIDE.

FIG. 7.5. LIE_ON_ ONE'S_ BACK

FIG. 7.6. LIE_ON_ ONE'S_ STOMACH

TREE

CL: predicate

MALE

CL-predicate

FIG. 7.7. A man leans against the tree.

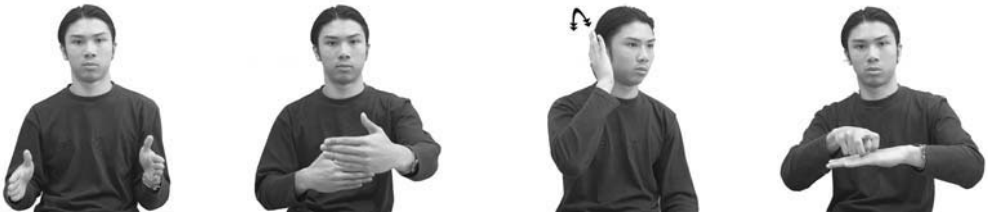
tive component which predicates something of the classified object" (Engberg-Pedersen, 1993, p. 240). The predicative meaning of the verb stem is a function of the interaction between the handshape unit with a specific palm and finger orientation and the movement unit.

Legged Entity. While STAND and LIE obligatorily select a Y-handshape, other posture verbs that obligatorily select a V-handshape are KNEEL (Fig. 7.8), SQUAT (Fig. 7.9), and STAND_ ON_ ONE'S_ LEG (Fig. 7.10). The V-handshape typically refers to a legged animate entity as argument in the predication. All these verbs select a V-handshape but they differ in the configuration and orientation of the selected fingers. In fact, in these cases the choice of handshape appears to be semantically motivated because these verbs entail the spatial configuration of the entity in the event, as in example (9):

(9) BOX MALE CL: A_ LEGGED_ ANIMATE_ ENTITY_ SQUAT_ON_ A_ FLAT_ SURFACE
GROUND FIGURE $\{[BE_L + FIGURE_i] + PATH_S + MANNER\}$ $GROUND_j$

'A man squats on the box'. (Fig. 7.9)

FIG. 7.8. KNEEL.



BOX MALE CL-predicate

FIG. 7.9. A man squats on the box.

FIG. 7.10. STAND_ON_ONE'S_LEG.

Example (9) shows that SQUAT requires the selected fingers of the V-handshape to face outward and the palm downward, but the palm is facing inward for KNEEL (Fig. 7.8).

In addition, we encounter verbs like SIT or HANG_ UPSIDE_ DOWN that may vary between a Y-handshape and a V-handshape. Such a variation appears to be a function of a shift in the signer's perspective. Instead of a whole entity, the signer shifts his perspective to the involvement of the legs of the entity in the fulfillment of the event. Therefore, with these verbs, the choice between the Y-handshape and V-handshape is subject to discourse factors such as the signer's perspective.

Complex MANNER in BE_L Predicates

The data from HKSL also reveal that not all signs that encode *MANNER* are incorporated into the verb stem. Signs created by imitating the real world spatial configuration of the entity are not incorporated into the classifier predicate. Events like 'A dog stands on its hind legs' involve a sign that imitates a specific standing posture of the dog. We will call this an 'imit-sign'. This sign is followed by another sign that involves a classifier predicate, as shown in (10):

(10) MALE CL: A_ HUMAN_ ENTITY_BE-LOCATED-AT,
FIGURE $\{[BE_L + FIGURE_i] + PATH_S\} \rightarrow GROUND_i$

'A man is located here'.

DOG STAND_ON_HIND_LEGS CL: AN_ ANIMATE_ ENTITIY_ STAND_ IN_ FRONT_ OF_ AN_ ANIMATE_ ENTITY
FIGURE MANNER $\{[BE_L + FIGURE_j] + PATH_S + MANNER\}$ $GROUND_i$

'A dog stands on its hind legs in front of the man'. (Fig. 7.11)

As shown in example (10), the semantic category of *MANNER* is complex and decomposable into (a) ON_ ONE'S_ HIND_ LEGS, and (b) STAND. As mentioned, STAND is represented by a Y-handshape that denotes *MANNER* of existence. Preceded by an 'imit-sign' that describes the manner of 'standing on one's hind legs', the legged property as one would expect to observe in the classificatory handshape of the predicate is no longer obligatory. This results in the adoption of a whole entity handshape for the figural entity (i.e., the dog) that 'stands' face to face with another whole entity that serves as *GROUND* (i.e., the man). Using an upright Y-handshape to re-

FIG. 7.11. A dog stands on its hind legs in front of the man.

FIG. 7.12. A man lies on his back on the grass.

fer to the animal category is a relatively marked representation, probably due to the requirement of encoding a specific manner of existence of the animal entity.

Another posture verb that reveals a similar property is LIE, expressions like 'lying on one's back' or 'lying on one's stomach' may be encoded by a sign that imitates the different lying postures, as shown in example (11) and Fig. 7.12:

(11) GRASS MALE LIE_ON_ONE'S_BACK CL: A_HUMAN_ ENTITY_ LIE_ON_ HIS_ BACK_ ON_ A_FLAT_ SURFACE
GROUND FIGURE MANNER $\{[BE_L + FIGURE_i] + PATH_S + MANNER\}$ $GROUND_j$

'A man lies on his back on the grass'. (Fig. 7.12)

This example demonstrates that *MANNER* may be encoded through imitating the real world activity of the entity in HKSL. The data below shows that palm orientation is crucial since it determines to some extent the occurrence of the 'imit-sign' in the sentence:

(12a) GRASS MALE CL: A_HUMAN_ ENTITY_ LIE_ON_ HIS_ BACK_ ON_ A_ FLAT_ SURFACE
(12b) GRASS MALE LIE_ON_ONE'S_BACK CL: A_ HUMAN_ ENTITY_ LIE_ ON_ HIS_ SIDE_ ON_ A_ FLAT_ SURFACE
(12c) GRASS MALE LIE_ON_ONE'S_BACK CL: A_HUMAN_ ENTITY_ LIE_ON_ HIS_ BACK_ON_ A_ FLAT_ SURFACE

'A man lies on his back on the grass. (Fig. 7.12)

In example (12a), the 'imit-sign' is optional if the palm orientation already encodes this specific spatial configuration of LIE (see Fig. 7.5 for LIE_ON_ONE'S_BACK). This sign is necessary in example (12b) because the unmarked form of LIE is used in the predicate (see Fig. 7.4 for LIE_ON_ONE'S_SIDE). In example (12c), it may occur even when the specific palm orientation is adopted. In this case, it is highly likely that the inclusion of the 'imit-sign' is a matter of emphasis. Further elicitation of this manner sign in terms of its distribution shows that it occurs quite freely in the sign sentence, as shown in example (13) below:

(13a) MALE GRASS LIE_ON_ONE'S_BACK CL: A_ HUMAN_ ENTITY_ LIE_ ON_ HIS_ BACK_ ON_ A_ FLAT_ SURFACE

(13b) MALE LIE_ON_ONE'S_BACK GRASS CL: A_ HUMAN_ ENTITY_ LIE_ ON_ HIS_ BACK_ ON_ A_ FLAT_ SURFACE

(13c) *GRASS LIE_ON_ONE'S_BACK MALE CL: A_ HUMAN_ ENTITY_ LIE_ ON_ HIS_ BACK_ ON_ A_ FLAT_ SURFACE

(13d) GRASS MALE CL: A_ HUMAN_ ENTITY_ LIE_ ON_ HIS_ BACK_ ON_ A_ FLAT_ SURFACE LIE_ ON_ ONE'S_ BACK

(13e) GRASS MALE LIE_ ON_ ONE'S_ BACK CL: A_ HUMAN_ ENTITY_ LIE_ ON_ HIS_ BACK_ ON_ A_ FLAT_ SURFACE

(13f) ?MALE CL: A_ HUMAN_ ENTITY_ LIE_ ON_ HIS_ BACK_ ON_ A_ FLAT_ SURFACE GRASS LIE_ON_ONE'S_BACK

The sentences listed under example (13) show that the 'imit-sign' always follows but seldom precedes the *FIGURE*, and it may precede or follow the predicate. Such evidence shows that this sign does not form part of the verb series in HKSL based on three accounts. First, it is optional if the palm orientation of the Y-handshape already specifies the posture appropriately. Second, its distribution is relatively free, as it may either precede or follow the predicate. Third, the series may be interrupted by other elements such as *GROUND*, as in example (13b) above. Therefore, these 'imit-signs' may be regarded as manner adjuncts and are not necessarily part of the verb series.

To conclude this section, given Talmy's conceptual model that *PATH* may refer to the site occupied by *FIGURE*, it follows that, in HKSL, the core schema of BE_L predicates is 'site' (i.e., $PATH_S$) rather than 'path' (i.e., $PATH_P$) of the figural entity. This core schema, $PATH_S$, is mapped onto the midlevel verb stem represented semantically as *[*BE_L + *FIGURE*]. Phoenetically, it is realized through a specific downward movement whose end point identifies a site (i.e., locus in space). The data above shows that [BE_L + *FIGURE*] can further combine with the co-event *MANNER* to encode manner of existence/location. *MANNER* in BE_L predicates is mainly expressed by hand/finger orientation while movement is held constant. Note that this form of movement does not entail motion or $PATH_P$ and shows no displacement of *FIGURE* in space. Engberg-Pedersen (1993) argued that in no way should this movement morpheme in the predicate be interpreted as "move a short way and stop" (Engberg-Pedersen, 1993, p. 256).

MOVE Predicates

This category of motion verbs is similar to BE_L in terms of event strcture. There is a general tendency for *GROUND* to precede *FIGURE*. However, it is also possible for *FIGURE* to precede *GROUND*, particularly when the figural entity is human and the agent of self-initiated motion and the ground entity is an inanimate entity.[14]

[MOVE + FIGURE] and $PATH_P$. For a main event that involves *[MOVE + FIGURE*] with $PATH_P$, HKSL exhibits a range of verbs that combines any one of the three movement types.[15] Below are just some examples:

a. Linear: ENTER, EXIT (inanimate), PASS, PASS-THROUGH, ASCEND, DESCEND, PART, RETURN, CROSS

b. Arc: EXIT (animate), ALIGHT_A_VEHICLE, GET_ON_A_VEHICLE, ARRIVE

c. Circle: MOVE_CONTINUOUSLY, MOVE_ TO_ AND_ FRO, MOVE_ IN_ A_ CIRCLE, MOVE_AROUND_AN_OBJECT

$PATH_P$ refers to the route of movement, which may be linear, arc or circular. The route represents the movement of an entity from one location to another in space. A linear movement generally denotes the moving of an entity on a flat surface or through a medium. It may also suggest the crossing of a boundary by a figural entity, as shown in examples (14a) and (14b). On some occasions, the arc movement may denote the crossing of a boundary such as 'a human entity boards or alights a vehicle' or 'a human entity exits an enclosure' (example [14c]). This monosyllabic movement also entails a telic motion event. A circular movement either outlines the actual route of movement of the figural entity or it may denote the imperfective or atelic aspect of the event, as shown in example (14d):

(14a) MALE HOUSE CL:A_ HUMAN_ENTITY_ENTER_ AN_ ENCLOSURE
FIGURE GROUND {[[MOVE + FIGURE$_i$]+ PATH$_P$ } GROUND$_j$

'A man enters a house'. (Fig. 7.13)

(14b) TRAIN CL:A_ VEHICLE _ EXIT _ AN_ OBLONG_ OBJECT_ IN_ HORIZONTAL_ POSITION
FIGURE {[MOVE + FIGURE$_i$]+ PATH$_P$} GROUND$_j$

'A train exits a tunnel'. (Fig. 7.14)

(14c) MALE HOUSE CL:A_ HUMAN_ENTITY_EXIT_ AN_ ENCLOSURE
FIGURE GROUND {[MOVE + FIGURE$_i$]+ PATH$_P$} GROUND$_j$

'A man exits a house'. (Fig. 7.15)

(14d) MALE HOUSE CL:A_ HUMAN_ENTITY_ MOVE_ TO_ AND_ FRO_ IN_ AN_ ENCLOSURE
FIGURE GROUND {[MOVE + FIGURE$_i$]+ PATH$_P$} GROUND$_j$

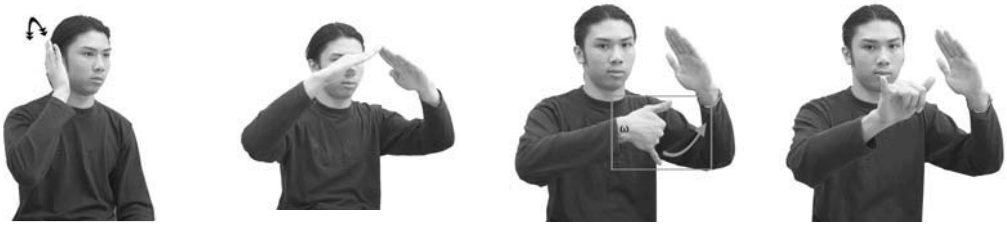
'A man walks to and fro inside a house'. (Fig. 7.16)

In examples (14a), (14c), and (14d), the path verbs select a Y-handshape which denotes a human whole entity. As discussed previously, this handshape in a vertical orientation is regarded as the unmarked form and it usually combines with path verbs. This finding also support Supalla's (1990) observation that, with everything being equal, there is a tendency for the signer to select an unmarked classificatory handshape for path verbs.

FIG. 7.13. A man enters a house.

TRAIN CL-predicate

FIG. 7.14. A train exits a tunnel.



MALE HOUSE CL-predicate

FIG. 7.15. A man exits a house.

MALE HOUSE CL-predicate

FIG. 7.16. A man walks to and fro inside a house.

Note that the data gives only partial support to Slobin and Hoiting's (1994) argument that crossing a boundary requires an arc movement. In HKSL, depending on the verb, crossing a boundary may involve either a linear or an arc movement. Also, animacy seems to determine the type of movement for some of these path verbs. It seems that inanimate objects such as vehicles or animals never select an arc movement to represent the crossing of a boundary (14b). Human entities select the arc movement, only on the occasion that the entity exits an enclosure.

[MOVE + FIGURE] and *MANNER*

Self-Contained MOTION. This particular category of verbs encodes the co-event of *MANNER* of motion at a location. Therefore, in terms of the semantic representation of the mo-

FIG. 7.17. A man trembles on the floor.

tion event, the core schema is $PATH_S$ rather than $PATH_P$. This type of manner of motion at a location is local or self-contained motion. Examples of verbs that fall into this category are TREMBLE, FLOAT, and WIGGLE.

(15) INDEX$_{FLOOR}$ MALE CL:A_HUMAN_ ENTITY_ LIE_ ON_ HIS_ BACK_ ON_ A_ FLAT_ SURFACE_ AND_ TREMBLE
GROUND FIGURE {[MOVE + FIGURE$_i$]+ PATH$_S$+MANNER} GROUND$_j$

'A man trembles on the floor'. (Fig. 7.17)

The verb TREMBLE in example (15) selects a Y-handshape that refers to a human whole entity. Due to $PATH_S$, the handshape with its orientation suggests a specific spatial configuration characteristic of the verb LIE_ON_ONE'S_BACK. Stationing the figual entity represented by the Y-handshape on the palm of the non-dominant 5-handshape reflects $PATH_S$. This ground entity is encoded by the size and shape specifier which denotes a flat, two-dimensional object. Self-contained motion is represented through trilled movement, that is, twisting the wrist of the dominant hand repeatedly. In this example, there is no translation motion of the figural entity from one location to another.

Manner of Motion Along a Path. Supalla (1990) identified two types of manner in verbs of motion in ASL: manner of locomotion and manner of motion along a path. According to him, for verb series that contain a locomotion verb and a path verb, the locomotion verb depicts movement of the limbs and selects certain marked body classifiers that refer to the hands or feet. These classifiers permit the manner of locomotion to be represented by a specific movement pattern of these body parts. Examples in ASL are RUN and SWIM. On the other hand, manner of motion along a path does not involve body classifiers but relatively unmarked handshapes like the Gd-handshape. According to Supalla, manner of motion along a path may be mapped onto the path verb.

In HKSL, the classificatory handshapes that are used to denote the manner of motion along a path for animate entities are the Y-handshape and V-handshape. Examples of verbs that encode the manner of motion along a path by means of a Y-handshape are ROLL, FLOAT, and FLY. Note that palm orientation is crucial for determining (a) whether the motion involves a human entity, and (b) posture. As discussed in the section beginning on page 148 (*BE$_L$— Predicates*),

FIG. 7.18. A child rolls across a bed.

FIG. 7.19. A bird flew across the sky.

animate entities, human and nonhuman, may be denoted by the same Y-handshape. What they differ is palm orientation, as shown in examples (16a) and (16b):

(16a) BED CHILD CL:A_HUMAN_ENTITY_ROLL_ACROSS_A_FLAT_SURFACE
GROUND FIGURE {[MOVE + FIGURE$_i$]+ PATH$_p$+MANNER} GROUND$_j$

'A child rolls across a bed'. (Fig. 7.18)

(16b) BIRD INDEX$_{SKY}$ CL: AN_ ANIMATE_ ENTITY_ IN_ HORIZONTAL_ POSITION_ MOVE_ IN_ A_ LINEAR_ PATH
FIGURE GROUND {[MOVE + FIGURE$_i$]+ PATH$_p$+MANNER} (GROUND$_j$)

'A bird flies across the sky'. (Fig. 7.19)

The Y-handshape of examples (16a) and (16b) differ in palm orientation as a result of posture differences and human/animal distinction. Given the fact that the Y-handshape with a vertical palm orientation is the unmarked form for a human entity, an orientation that deviates from this default representation leads to two interpretations. The first interpretation is that the handshape with a different orientation may denote a specific posture such as 'lie' and 'squat'. The second interpretation is that it refers to a different noun category; that is, the Y-handshape with a downward palm orientation could well refer to animals due to the spatial configuration of the animal category in the real world. Therefore, in example (16b), the Y-handshape refers to a bird in the

real world discourse because the palm is facing down, and such an orientation denotes an entity longer than it is wide and with its back facing the sky.[16] In example (16a), the outward palm orientation suggests a lying posture of an animate entity, and human in this case. The manner of self-contained motion is expressed through a repeated local movement; precisely, it involves repeated twisting of the wrist of the dominant hand while it travels along a linear path on a flat surface (see Fig. 7.18).

Examples of verbs in HKSL that allow a V-handshape are WALK, SWIM, and LIMP. Building on the core schema $PATH_P$, the manner of motion is encoded by trilled movement; that is, the wiggling of the selected fingers (WALK or SWIM) or by swaying the selected fingers in space (LIMP). Another example is JUMP_WITH_TWO_LEGS, which involves a repeated up and down movement of the V-handshape along a path movement.

Manner of Locomotion. Similar to the ASL and the SLN data, manner of locomotion is mapped onto the first verb of the verb series followed by a path verb in the form of a classifier predicate. This observation also confirms Slobin and Hoiting's (1994) suggestion that universally concepts are represented in a clause in the sequence of MANNER-DIRECTION-GOAL. In HKSL, manner of locomotion is typically coded as the first verb of the verb series.

(17) CHILD HOUSE RUN CL: A_ HUMAN_ WHOLE_ ENTITY_ ENTERS_ AN _ ENCLOSURE
FIGURE GROUND MANNER {[MOVE + FIGURE$_i$]+ PATH$_P$} GROUND$_j$

'A child runs into a house'. (Fig. 7.20)

Examples of locomotion verbs that display manner of locomotion are RUN, MARCH, FLY, POUNCE_ON. According to Supalla (1990), in ASL, locomotion verbs are followed by path verbs the handshapes of which are relatively unmarked. Moreover, the locomotion verb and the path verb in the predicate constitute an uninterrupted sequence, similar to the sequence of the serial verb constructions in spoken languages like Chinese and Thai. Lastly, the second verb of the verb series is not combined with MANNER, but with PATH. In HKSL, while locomotion verbs precede path verbs, discrepancies are observed with regard to the continuity of the verb series and the manner of motion along a path in path verbs.

In HKSL, it is possible to insert the ground entity between the locomotion verb and the remaining part of the predicate, as shown in (18a) below. Note that reversing the order of the locomotion verb and the path verb is consistently rejected by all informants (example [18b]). A sequence as such would violate the universal order of semantic representation.

FIG. 7.20. A child runs into a house.

(18a) CHILD RUN HOUSE CL: A_HOUSE_BE_ LOCATED CL: A_ HUMAN_ WHOLE_ ENTITY_ ENTER_ AN _ ENCLOSURE
FIGURE MANNER GROUND {[BE$_L$ + FIGURE$_j$]+PATH$_0$}→GROUND$_j$ [MOVE + FIGURE$_i$]+PATH$_P$} GROUND$_j$

'A child runs into the house'.

(18b) *CHILD HOUSE CL: A_HOUSE_BE_LOCATED CL: A_ HUMAN_ WHOLE_ ENTITY_ ENTER_ AN _ ENCLOSURE RUN
FIGURE GROUND {[BE$_L$ + FIGURE$_j$]+PATH$_S$}→GROUND$_j$ {[MOVE + FIGURE$_i$]+ PATH$_P$} GROUND$_j$ MANNER

'A child runs into the house'.

The second discrepancy has to do with the conflation pattern of manner of locomotion and manner of motion along a path in the verb series. Similar to ASL or SLN, the first verb is encoded with manner of locomotion. However, whether manner of motion along a path is coded in the following path verb depends on which classificatory handshape is adopted. In example (18a), a Y-handshape is adopted to refer to a whole entity and *MANNER* is not coded in this path verb 'enter'. However, it is possible for manner of motion along a path to be conflated with the path verb, similar to ASL; but such a conflation is restricted to those classifiers that involve the legged property of the noun category. Note that in ASL, the less marked classifiers can be legged (V-handshape) or whole entity (Gd-handshape). For human entities, if for some discourse motivation that triggers the adoption of a V-handshape for the predicate in example (18a), one would expect to observe the manner of motion along a path in the path verb. This is represented by the internal wiggling of the two selected fingers of the V-handshape. In this case, the manner of locomotion is incorporated into the locomotion verb (i.e., RUN in example [18a]) and the manner of motion along a path is conflated with the path verb. Unlike ASL, verbs like RUN, MARCH, and LIMP do not involve body classifiers; they are 'imit-signs' which reflect the actual locomotion of the limbs in the real world activity (see RUN in Fig. 7.20).

For animal entities, the unmarked form is the Y-handshape with the palm facing down. As a handshape for denoting a whole entity, it is restricted to denoting manner of motion along a path. Note that the V-handshape is not adopted as an alternative classificatory handshape for the animal category. However, there has emerged a new classificatory handshape to denote the legged property of the animal category in HKSL. This is in the form of a bent 5-handshape with the palm facing down. This handshape may incorporate the manner of motion along a path, which could mean the manner of running or walking along a path.

Example (19) below illustrates the conflation of manner of locomotion and manner of motion along a path in the predicate of the sentence 'A dog pounces on a man'.

(19) MAN CL: A_ HUMAN_ ENTITY_ BE_LOCATED_AT,
FIGURE {[BE$_L$ + FIGURE$_i$]+PATH$_S$}— GROUND$_i$

'A man is located here'.

DOG POUNCE_ON CL: AN_ ANIMAL_ MOVE_ ONTO_ A_ HUMAN_ ENTITY
FIGURE MANNER {[MOVE+FIGURE$_j$]+ PATH$_P$+MANNER} GROUND$_i$

'A dog pounces on the man'. (Fig. 7.21)

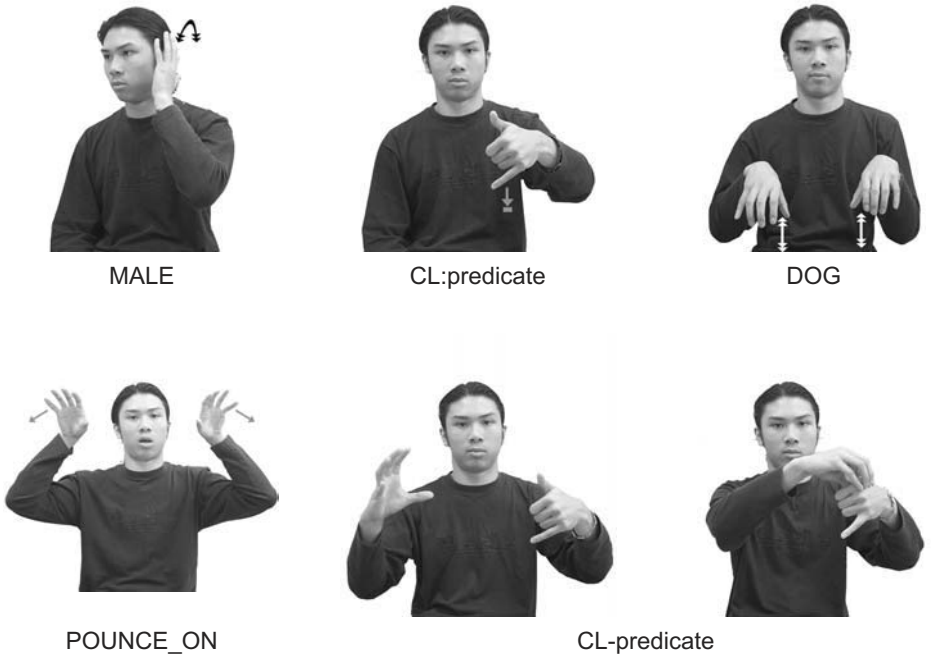


FIG. 7.21. A dog pounces on the man.

In this verb series, the path verb that is conflated with manner of motion along a path is preceded by a locomotion verb represented by an 'imit-sign'. The path verb involves a bent 5-handshape referring to animals with claws. This specific handshape combines with an arc movement morpheme is glossed as MOVE_ONTO an object. This movement ends with a hold on the Y-handshape associated with a human ground entity.

To conclude, HKSL is similar to ASL and SLN in that, in the verb series, the locomotion verb usually precedes the path verb. Also, manner of motion along a path is mapped onto the path verb; but in HKSL, such a conflation is restricted to those classifiers that show the legged property of the noun category. In fact, it seems that the Y-handshape in HKSL is rich in denoting manner of spatial configuration when the core schema is $PATH_S$. When the core schema is $PATH_P$, the manner of motion along a path is associated with a subset of classificatory handshapes that highlight the legged property of the noun category. The manner of locomotion appears to form a unique category in HKSL, the data so far reveal that they are associated more with imitating the specific pattern of movement of the entity in the real world activity rather than with specific classificatory handshapes.

CONCLUSION

In the analysis above, we demonstrated how the four basic semantic components of a motion event are lexicalized as verbs of motion and location in HKSL. We take [[$MOVE/BE_L$] + *FIGURE*] to be an abstract core unit from which a verb stem is formed and examine how other se-

mantic components are conflated with it. We observe that manner of existence is mainly denoted by palm or finger orientation; that manners that denote posture, manner of locomotion, or manner of motion along a path may lead to a complex system of conceptual representation. Also, the 'imit-sign' that imitate the real world activity usually precedes a classifier predicate. However, the status of this sign is not so clear, at least not so in HKSL. The findings that it occurs quite freely and that it is does not involve a classifier predicate in HKSL make one wonder whether this sign forms part of the verbal predicate in the language. As the investigation on HKSL has just begun, more data are needed in order to examine the linguistic status of these signs in the so-called 'serial verb construction'.

At any rate, to ascribe linguistic status to the different elements in the predicate, one must ask whether this conceptual model of motion event has any psychological reality. Do native signers perceive [[*MOVE/BE*$_L$] + *FIGURE*] as the underlying semantic representation of the verb stem? Are there any constraints in the morphological derivation of classifier predicates? Another question is whether the conflation process is simultaneous or sequential. We believe that in order to resolve this puzzle, we have to go beyond what we see and try to discover the constraints in the derivation of [[*MOVE/BE*$_L$] + *FIGURE*] as an abstract core unit. An understanding of these constraints might throw light on the analysis of the morphological derivation of verbs of motion and location in HKSL.

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ENDNOTES

[1]In this chapter, the semantic categories are presented in italicized capital letters (e.g. *MANNER*). The HKSL signs are glossed and presented in simple capital letters. Signs that are glossed with more than one word are underscored. Where the data involve ASL signs, they will be noted separately.

[2]Other types of framing events include events of contouring in time (aspect), events of change or constancy among states, and events of correlation among actions, and events of fulfillment or confirmation in the domain of realization.

[3]Other co-events are *CAUSE*, *PRECURSION*, *ENABLEMENT*, *CONCOMITANCE*, *PURPOSE*, and *CONSTITUTIVENESS* (see Talmy, 2000, for explanation).

[4]Sometimes, both *PATH* and *GROUND* constitute the core schema of the event. Atsugewi displays this phenomenon. Though limited, there are a few verbs in English that also display this *PATH* and *GROUND* conflation pattern. Examples are 'He boxed the rolls of tissue' or 'The ship berthed there'.

[5]Note that English has a set of *PATH* verbs such as exit, enter, cross. But they are relatively less productive than verbs that are conflated with *MANNER*.

[6]In a recent analysis of child language acquisition, Choi and Bowerman (1995) added to the list *MOTION+DEIXIS*, defined as 'motion toward the speaker versus motion away from the speaker'. *DEIXIS* in Talmy's framework is regarded as a type of co-event on a par with *MANNER* and *CAUSE*.

[7]Various terms have been put forward to refer to this grammatical construction, classifier predicates (Corazza, 1990; Schick, 1990), verbs of motion and location (Supalla, 1986, 1990; Slobin & Hoiting, 1994); polymorphemic predicates (Collins-Ahlgren, 1990; Wallin, 1990), or polymorphemic verbs

(Engberg-Pedersen, 1993), to name but a few. For ease of reference, this chapter adopts the conventional terminology of 'classifier predicates'.

[8]Supalla (1986) proposed that there are two parts to this kind of construction: the movement root and handshape, the latter of which is considered as an obligatory 'affix' attached to the root.

[9]This verb serialization of the sample SLN sentence is conceived as a single event of motion whose third verb in the series is ENTER. This verb, according to the authors, is not inflected for '*FIGURE*' but simply implies crossing a boundary.

[10]Supalla actually argues that the path verb may be inflected for manner of motion along a path. However, such a realization is in a reduced form, through the use of a less marked classifier handshape like the V- or the Gd-handshape.

[11]BE_L refers to BE-LOCATED-AT.

[12]This last line represents the conceptual structure of the motion event in question. 'CL' refers to classifier predicates.

[13]Some deaf signers may rest the Y-handshape on the palm of a 5-handshape to encode SIT.

[14]The description so far seems to suggest that a sequential presentation of semantic components in a motion predicate is the norm. However, we do observe that one of our native signers, a relatively older female, occasionally presented both *FIGURE* and *GROUND* simultaneously, followed by an index sign and a noun for referential identification. Whether such a representation is due to other factors, such as age, needs further investigation.

[15]Talmy (2000) suggested that signed languages may have *CONTOUR* and *DIRECTION* as the subcomponents of *PATH*. *CONTOUR* is *MOTION* that outlines the ground entity upon which the figural entity acts. Our project did not investigate these categories in detail. We would expect that *CONTOUR* is represented by a specific movement pattern of the figural entity. This pattern implicitly suggests the 'contour' of the ground entity such as 'a meandering river' or 'an undulating slope'. *DIRECTION* requires that the ground entity has already assumed a locus in space. As a result, the direction and route of movement of the figural entity is determined by the location of the ground entity in space.

[16]The location where the sign is articulated also suggests a nonhuman entity. The predicate is articulated in the space above the head level, signaling an object moving above the head of the signer.

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Commentary

8

The Representation of Spatial Structure in Spoken and Signed Language

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INTRODUCTION[1]

This chapter combines and relates new findings on spatial structuring in two areas of investigation, spoken language and signed language. Linguistic research to date has determined many of the factors that structure the spatial schemas found across spoken languages (e.g., Bennett, 1975; Clark, 1973; Fillmore, 1968; Gruber, 1976, Herskovits, 1982; Jackendoff, 1983; Leech, 1969, Zubin & Svorou, 1984, as well as myself, Talmy, 1983, 2000a, 2000b). It is now feasible to integrate these factors and to determine the comprehensive system they constitute for spatial structuring in spoken language. This system is characterized by several features. With respect to constituency, there is a relatively closed, universally available inventory of fundamental spatial elements that in combination form whole schemas. There is a relatively closed set of categories in which these elements appear. And there is a relatively closed, small number of particular elements in each category, hence, of spatial distinctions that each category can ever mark. With respect to synthesis, selected elements of the inventory are combined in specific arrangements to make up the whole schemas represented by closed-class spatial forms. Each such whole schema that a closed-class form represents is thus a "prepackaged" bundling together of certain elements in a particular arrangement. Each language has in its lexicon a relatively closed set of such prepackaged schemas (larger than that of spatial closed-class forms, due to polysemy) that a speaker must select among in depicting a spatial scene. Finally, with respect to the whole schemas themselves, these schemas can undergo a certain set of processes that extend or deform them. Such processes are perhaps part of the overall system so that a language's relatively closed set of spatial schemas can fit more spatial scenes.

An examination of signed language[2] shows that its structural representation of space systematically differs from that in spoken language in the direction of what appear to be the structural characteristics of scene parsing in visual perception. Such differences include the following: Signed language can mark finer spatial distinctions with its inventory of more structural elements, more categories, and more elements per category. It represents many more of these distinctions in any particular expression. It also represents these distinctions independently in the expression, not bundled together into prepackaged schemas. And its spatial representations are largely iconic with visible spatial characteristics.

When formal linguistic investigation of signed language began several decades ago, it was important to establish in the context of that time that signed language was in fact a full genuine language, and the way to do this, it seemed, was to show that it fit the prevailing model of language, the Chomskyan–Fodorian language module. Since then, however, evidence has been steadily accruing that signed language does diverge in various respects from spoken language. The modern response to such observations—far from once again calling into question whether signed language is a genuine language—should be to rethink what the general nature of language is. Our findings suggest that instead of some discrete, whole-language module, spoken language and signed language are both based on some more limited core linguistic system that then connects with different further subsystems for the full functioning of the two different language modalities.

FUNDAMENTAL SPACE-STRUCTURING ELEMENTS AND CATEGORIES IN SPOKEN LANGUAGE

An initial main finding emerges from analysis of the spatial schemas expressed by closed-class (grammatical) forms across spoken languages. There is a relatively closed and universally available inventory of fundamental conceptual elements that recombine in various patterns to constitute those spatial schemas. These elements fall within a relatively closed set of categories, with a relatively closed small number of elements per category.

The Target of Analysis

As background to this finding, spoken languages universally exhibit two different subsystems of meaning-bearing forms. One is the "open-class" or "lexical" subsystem, composed of elements that are great in number and readily augmented —typically, the roots of nouns, verbs, and adjectives. The other is the "closed-class" or "grammatical" subsystem, consisting of forms that are relatively few in number and difficult to augment—including such bound forms as inflections and such free forms as prepositions and conjunctions. As argued in Talmy (2000a, chap. 1), these subsystems basically perform two different functions: open-class forms largely contribute conceptual content, whereas closed-class forms determine conceptual structure. Accordingly, our discussion focuses on the spatial schemas represented by closed-class forms so as to examine the concepts used by language for structuring purposes.

Across spoken languages, only a portion of the closed-class subsystem regularly represents spatial schemas. We can identify the types of closed-class forms in this portion and group them according to their kind of schema. The types of closed-class forms with schemas for paths or sites include the following:

1. Forms in construction with a nominal, such as prepositions like English *across* (as in *across the field*) or noun affixes like the Finnish illative suffix -:*n* 'into', as well as prepositional complexes such as English *in front of* or Japanese constructions with a "locative noun" like *ue* 'top surface', (as in *teeburu no ue ni* 'table GEN top at' = "on the table");
2. forms in construction with a verb, such as verb satellites like English *out*, *back*, and *apart* (as in, *They ran out/back/apart*);
3. deictic determiners and adverbs such as English *this* and *here*;
4. indefinites, interrogatives, relatives, etc., such as English *everywhere/whither/wherever*);
5. qualifiers such as English *way* and *right* (as in, *It's way/right up there*); and
6. adverbials like English *home* (as in, *She isn't home*).

Types of closed-class forms with schemas for the spatial structure of objects include the following:

1. Forms modifying nominals such as markers for plexity or state of boundedness, like English -s for multiplexing (as in *birds*) or *-ery* for debounding (as in *shrubbery*);
2. numeral classifiers like Korean *chang* 'planar object'; and
3. forms in construction with the verb, such as some Atsugewi Cause prefixes, like *cu-* 'as the result of a linear object moving axially into the Figure'.

Finally, sets of closed-class forms that represent a particular component of a spatial event of motion/location include the following:

1. The Atsugewi verb–prefix set that represents different Figures;
2. the Atsugewi verb–suffix set that represents different Grounds (together with Paths);
3. the Atsugewi verb–prefix set that represents different Causes; and
4. the Nez Perce verb–prefix set that represents different Manners (see Talmy, 2000b, chaps. 1 and 2).

Determining the Elements and Categories

A particular methodology is used to determine fundamental spatial elements in language. One starts with any closed-class spatial morpheme in any language, considering the full schema that it expresses and a spatial scene to which it can apply. One then determines any factor one can change in the scene so that the morpheme no longer applies to it. Each such factor must therefore correspond to an essential element in the morpheme's schema. To illustrate, consider the English preposition *across* and the scene it refers to in, *The board lay across the road*. Let us here grant the first two elements in the *across* schema (demonstrated elsewhere): (1) a Figure object (here, the board) is spatially related to a Ground object (here, the road); and (2) the Ground is ribbonal—a plane with two roughly parallel line edges that are as long as or longer than the distance between them. The remaining elements can then be readily demonstrated by the methodology. Thus, a third element is that the Figure is linear, generally bounded at both ends. If the board were instead replaced by a planar object, say, some wall siding, one could no longer use the original *across* preposition but would have to switch to the schematic domain of another preposition,

that of *over*, as in, *The wall siding lay over the road*. A fourth element is that the axes of the Figure and of the Ground are roughly perpendicular. If the board were instead aligned with the road, one could no longer use the original *across* preposition but would again have to switch to another preposition, *along*, as in, *The board lay along the road*. Additionally, a fifth element of the *across* schema is that the Figure is parallel to the plane of the Ground. In the referent scene, if the board were tilted away from parallel, one would have to switch to some other locution such as, *The board stuck into/out of the road*. A sixth element is that the Figure is adjacent to the plane of the Ground. If the board were lowered or raised away from adjacency, even while retaining the remaining spatial relations, one would need to switch to locutions like, *The board lay (buried) in the road./The board was (suspended) above the road*. A seventh element is that the Figure's length is at least as great as the Ground's width. If the board were replaced by something shorter, for example, a baguette, while leaving the remaining spatial relations intact, one would have to switch from *across* to *on*, as in, *The baguette lay on the road*. An eighth element is that the Figure touches both edges of the Ground. If the board in the example retained all its preceding spatial properties but were shifted axially, one would have to switch to some locution like, *One end of the board lay over one edge of the road*. Finally, a ninth element is that the axis of the Figure is horizontal (the plane of the Ground is typically, but not necessarily, horizontal). Thus, if one changes the original scene to that of a spear hanging on a wall, one can use *across* if the spear is horizontal, but not if it is vertical, as in, *The spear hung across the wall./The spear hung up and down on the wall*. Thus, from this single example, the methodology shows that at least the following elements figure in closed-class spatial schemas: a Figure and a Ground, a point, a line, a plane, a boundary (a point as boundary to a line, a line as boundary to a plane), parallelness, perpendicularity, horizontality, adjacency (contact), and relative magnitude.

In the procedure of systematically testing candidate factors for their relevance, the elements just listed have proved to be essential to the selected schema and hence, to be in the inventory of fundamental spatial elements. But it is equally necessary to note candidates that do not prove out, so as to know which potential spatial elements do not serve a structuring function in language. In the case of *across*, for example, one can probe whether the Figure, like the board in the referent scene, must be planar—rather than simply linear—and coplanar with the plane of the Ground. It can be seen, though, that this is not an essential element to the *across* schema, because this factor can be altered in the scene by standing the board on edge without any need to alter the preposition, as in, *The board lay flat/stood on edge across the road*. Thus, coplanarity is not shown by *across* to be a fundamental spatial element. However, it does prove to be so in other schemas, and so in the end must be included in the inventory. This is seen for one of the schemas represented by English *over*, as in, *The tapestry hung over the wall*. Here, both the Figure and Ground must be planes and coplanar with each other. If the tapestry here were changed to something linear, say, a string of beads, it is no longer appropriate to use *over* but only something like against, as in, *The string of beads hung *over/against the wall*. Now, another candidate element—that the Figure must be rigid, like the board in the scene—can be tested and again found to be inessential to the *across* schema, because a flexible linear object can be substituted for the board without any need to change the preposition, as seen in, *The board/The cable lay across the road*. Here, however, checking this candidate factor across numerous spatial schemas in many languages might well never yield a case in which it does figure as an essential element and so would be kept off the inventory.

This methodology affords a kind of existence proof: It can demonstrate that some element does occur in the universally available inventory of structural spatial elements because it can be

seen to occur in at least one closed-class, spatial schema in at least one language. The procedure is repeated numerous times across many languages to build up a sizable inventory of elements essential to spatial schemas.

The next step is to discern whether the uncovered elements comprise particular structural categories and, if so, to determine what these categories are. It can be observed that for certain sets of elements, the elements in a set are mutually incompatible—only one of them can apply at a time at some point in a schema. Such sets are here taken to be basic spatial categories. Along with their members, such categories are also part of language's fundamental conceptual structuring system for space. A representative sample of these categories is presented next.

It will be seen that these categories generally have a relatively small membership. This finding depends in part on the following methodological principles. An element proposed for the inventory should be as coarse-grained as possible—that is, no more specific than is warranted by cross-schema analysis. Correlatively, in establishing a category, care must be taken that it include only the most generic elements that have actually been determined —that is, that its membership have no finer granularity than is warranted by the element-abstraction procedure. For example, the principle of mutual incompatibility yields a spatial category of "relative orientation" between two lines or planes, a category with perhaps only two member elements (both already seen in the *across* schema): approximately parallel and approximately perpendicular. Some evidence additionally suggests an intermediary "oblique" element as a third member of the category. Thus, some English speakers may distinguish a more perpendicular sense from a more oblique sense, respectively, for the two verb satellites *out* and *off*, as in, *A secondary pipe branches out/off from the main sewer line*. In any case, though, the category would have no more than these two or three members. Although finer degrees of relative orientation can be distinguished by other cognitive systems, say, in visual perception and in motor control, the conceptual structuring subsystem of language does not include anything finer than the two- or three-way distinction. The procedures of schema analysis and cross-schema comparison, together with the methodological principles of maximum granularity for elements and for category membership, can lead to a determination of the number of structurally distinguished elements ever used in language for a spatial category.

Sample Categories and Their Member Elements

The fundamental categories of spatial structure in the closed-class subsystem of spoken language fall into three classes according to the aspect of a spatial scene to which they pertain: the segmentation of the scene into individual components, the properties of an individual component, and the relation of one such component to another. In a fourth class are categories of nongeometric elements frequently found in association with spatial schemas. A sampling of categories and their member elements from each of these four classes is presented next. The examples provided here are primarily drawn from English but can be readily multiplied across a diverse range of languages (see Talmy, 2000a, chap. 3). Throughout this chapter, category names are enclosed in double quotes.

Categories Pertaining to Scene Segmentation

The class designated as scene segmentation may include only one category, that of "major components of a scene", and this category may contain only three member elements: the Figure, the

Ground, and a secondary Reference Object. Figure and Ground were already seen for the *across* schema. Schema comparison shows the need to recognize a third scene component, the Secondary Reference Object—in fact, two forms of it: encompassive of or external to the Figure and Ground. The English preposition *near*, as in, *The lamp is near the TV* specifies the location of the Figure (the lamp) only with respect to the Ground (the TV). But localizing the Figure with the preposition *above*, as in, *The lamp is above the TV*, requires knowledge not only of where the Ground object is, but also of the encompassive earth-based spatial grid, in particular, of its vertical orientation. Thus, *above* requires recognizing three components within a spatial scene, a Figure, a Ground, and a Secondary Reference Object of the encompassive type. Comparably, the schema of *past*, in *John is past the border*, only relates John as Figure to the border as Ground. One could say this sentence on viewing the event through binoculars from either side of the border. But, *John is beyond the border*, can be said only by someone on the side of the border opposite John, hence the *beyond* schema establishes a perspective point at that location as a secondary Reference Object—in this case, of the external type.

Categories Pertaining to an Individual Scene Component

A number of categories pertain to the characteristics of an individual spatial scene component. This is usually one of the three major components resulting from scene segmentation—the Figure, Ground, or Secondary Reference Object—but it could be others, such as the path line formed by a moving Figure. One such category is that of "dimension" with four member elements: zero dimensions for a point, one for a line, two for a plane, and three for a volume. Some English prepositions require a Ground object schematizable for only one of the four dimensional possibilities. Thus, the schema of the preposition *near* as in, *near the dot*, requires only that the Ground object be schematizable as a point. *Along*, as in, *along the trail*, requires that the Ground object be linear. *Over*, as in, *a tapestry over a wall*, requires a planar Ground. And *throughout*, as in, *cherries throughout the jello*, requires a volumetric Ground.

A second category is that of "number" with perhaps four members: one, two, several, and many. Some English prepositions require a Ground comprising objects in one or another of these numbers. Thus, *near* requires a Ground consisting of just one object, *between* of two objects, *among* of several objects, and *amidst* of numerous objects, as in, *The basketball lay near the boulder/between the boulders/among the boulders/amidst the corn stalks*. The category of number appears to lack any further members—that is, closed-class spatial schemas in languages around the world seem never to incorporate any other number specifications—such as 'three' or 'even-numbered' or 'too many'.

A third category is that of "motive state", with two members: motion and stationariness. Several English prepositions mark this distinction for the Figure. Thus, in one of its senses, *at* requires a stationary Figure, as in, *I stayed/*went at the library*, while *into* requires a moving Figure, as in, *I went/*stayed into the library.* Other prepositions mark this same distinction for the Ground object (in conjunction with a moving Figure). Thus, *up* to requires a stationary Ground (here, the deer), as in, *The lion ran up to the deer*, while *after* requires a moving Ground as in, *The lion ran after the deer.* Apparently no spatial schemas mark such additional distinctions as motion at a fast versus slow rate, or being located at rest vs. remaining located fixedly.

A fourth category is that of "state of boundedness" with two members: bounded and unbounded. The English preposition *along* requires that the path of a moving Figure be unbounded, as shown by its compatibility with a temporal phrase in *for* but not *in*, as in, *I walked*

*along the pier for 10 minutes/*in 20 minutes*. But the spatial locution *the length of* requires a bounded path, as in, *I walked the length of the pier in 20 minutes/*for 10 minutes*.[3] Some spatial schemas have the bounded element at one end of a line and the unbounded element at the other end, apparently no spatial schema marks any distinctions other than the two cited states of boundedness. For example, there is no cline of gradually increasing boundedness, nor a gradient transition, although just such a "clinal boundary" appears elsewhere in our cognition, as in geographic perception or conception, for example, in the gradient demarcation between full forest and full meadowland (Mark & Smith, 2001).

Continuing the sampling of this class, a fifth category is that of "directedness" with two members: basic and reversed. A schema can require one or the other of these elements for an encompassive Ground object, as seen for the English prepositions in, *The axon grew along/against the chemical gradient*, or for the Atsugewi verb satellites for (moving) 'downstream' and 'upstream'. Or it can require one of the member elements for an encompassive Secondary Reference Object (here, the line), as in, *Mary is ahead of/behind John in line*.

A sixth category is "type of geometry" with two members: rectilinear and radial. This category can apply to an encompassive Secondary Reference Object to yield reference frames of the two geometric types. Thus, in a subtle effect, the English verb satellite *away*, as in, *The boat drifted farther and farther away/out from the island*, tends to suggest a rectilinear reference frame in which one might picture the boat moving rightward along a corridor or sea lane with the island on the left (as if along the x-axis of a Cartesian grid). But *out* tends to suggest a radial reference frame in which the boat is seen moving from a center point along a radius through a continuum of concentric circles. In the type of geometry category, the radial-geometry member can involve motion about a center, along a radius, or along a periphery. The first of these is the basis for a further category, that of "orientation of spin axis", with two members: vertical and horizontal. The English verb satellites *around* and *over* specify motion of the Figure about a vertical or horizontal spin axis, respectively, as in, *The pole spun around/I toppled over*, and in, *I turned the pail around/over.*

An eighth category is "phase of matter", with three main members, solid, liquid, and empty space, and perhaps a fourth member, fire. Thus, among the dozen or so Atsugewi verb satellites that subdivide the semantic range of English *into* plus a Ground object, the suffix *-ik'ṣ* specifies motion horizontally into solid matter (as chopping an ax into a tree trunk), *-ic't* specifies motion into liquid, *-ipsnu* specifies motion into the empty space of a volumetric enclosure, and *-caw* specifies motion into a fire. The phase of matter category even figures in some English prepositions, albeit covertly. Thus, *in* can apply to a Ground object of any phase of matter, whereas inside can apply only to one with empty space, as seen in, *The rock is in / inside the box*; *in/*inside the ground*; *in/*inside the puddle of water*; *in/*inside the fire*.

A final category in this sampled series is that of "state of consolidation" with apparently two members: compact (precisional) and diffuse (approximative). The English locative prepositions *at* and *around* distinguish these two concepts, respectively, for the area surrounding a Ground object, as in, *The other hiker will be waiting for you at/around the landmark*. The two deictic adverbs in, *The hiker will be waiting for you there/thereabouts*, mark the same distinction (unless *there* is better considered neutral to the distinction). And in Malagasy (Imai, 1999), two locative adverbs for 'here' mark this distinction, with *eto* for 'here within this bounded region', typically indicated with a pointing finger, and *ety* for 'here spread over this unbounded region', typically indicated with a sweep of the hand. In addition to this sampling, some ten or so further categories pertaining to properties of an individual schema component, each category with a small number of fixed contrasts, can be readily identified.

Categories Pertaining to the Relation of One Scene Component to Another

Another class of categories pertains to the relations that one scene component can bear to another. One such category was described earlier, that of "relative orientation", with two or three members: parallel, perpendicular, and perhaps oblique. A second such category is that of "degree of remove", of one scene component from another. This category appears to have four or five members, two with contact between the components—coincidence and adjacency—and two or three without contact—proximal, perhaps medial, and distal remove. Some pairwise contrasts in English reveal one or another of these member elements for a Figure relating to a Ground. Thus, the locution, *in the front of*, as in, *The carousel is in the front of the fairground*, expresses coincidence, because the carousel as Figure is represented as being located in a *part* of the fairground as Ground. But, *in front of* (without a *the*), as in, *The carousel is in front of the fairground*, indicates proximality, because the carousel is now located outside the fairground and near it but not touching it. The distinction between proximal and distal can be teased out by noting that *in front of* can only represent a proximal but not a distal degree of remove, as seen in the fact that one can say, *The carousel is 20 feet in front of the fairground*, but not **The carousel is 20 miles in front of the fairground*, whereas *above* allows both proximal and distal degrees of remove, as seen in, *The hawk is 1 foot/1 mile above the table*. The distinction between adjacency and proximality is shown by the prepositions *on* and *over*, as in, *The fly is on/over the table*. Need for a fifth category member of 'medial degree of remove' might come from languages with a 'here/there/yonder' kind of distinction in their deictic adverbs or demonstratives.

A third category in this series is that of "degree of dispersion" with two members: sparse and dense. To begin with, English can represent a set of multiple Figures, say, 0-dimensional peas, as adjacent to or coincident with a 1-, 2-, or 3-dimensional Ground, say, with a knife, a tabletop, or aspic, in a way neutral to the presence or absence of dispersion, as in, *There are peas on the knife*; *on the table*; *in the aspic*. But in representing dispersion as present, English can (or must) indicate its degree. Thus, a sparse degree of dispersion is indicated by the addition of the locution, *here and there*, optionally together with certain preposition shifts, as in, *There are peas here and there on/along the knife*; *on/over the table*; *in the aspic*. And for a dense degree of dispersion, English has the three specialized forms, *all along*, *all over*, and *throughout*, as seen in, *There are peas all along the knife*; *all over the table*; *throughout the aspic*.

A fourth category is that of "path contour" with perhaps some four members: straight, arced, circular, and meandering. Some English prepositions require one or another of these contour elements for the path of a Figure moving relative to a Ground. Thus, *across* indicates a straight path, as seen in, *I drove across the plateau/*hill*, while *over*—in its usage referring to a single path line—indicates an arced contour, as in, *I drove over the hill/*plateau*. In one of its senses, *around* indicates a roughly circular path, as in, *I walked around the maypole*, and *about* indicates a meandering contour, as in, *I walked about the town*. Some ten or so additional categories for relating one scene component to another, again each with its own small number of member contrasts, can be readily identified.

Nongeometric Categories

All the preceding elements and their categories have broadly involved geometric characteristics of spatial scenes or the objects within them—that is, they have been genuinely spatial. But a number of nongeometric elements are recurrently found in association with otherwise geometric schemas. One category of such elements is that of "force dynamics" (see Talmy 2000a, chap.

7) with two members: present and absent. Thus, geometrically, the English prepositions *on* and *against* both represent a Figure in adjacent contact with a Ground, but in addition, *on* indicates that the Figure is supported against the pull of gravity through that contact whereas *against* indicates that it is not, as seen in, *The poster is on/*against the wall* and *The floating helium balloon is against/*on the wall*. Cutting the conceptualization of force somewhat differently (M. Bowerman, personal communication), the Dutch preposition *op* indicates a Figure supported comfortably in a natural rest state through its contact with a Ground, whereas *aan* indicates that the Figure is being actively maintained against gravity through contact with the Ground, so that flesh is said to be "op" the bones of a live person but "aan" the bones of a dead person.

A second nongeometric category is that of "accompanying cognitive/affective state", although its extent of membership is not clear. One recurrent member, however, is the attitude toward something that it is unknown, mysterious, or risky. Perhaps in combination with elements of inaccessibility or nonvisibility, this category member is associated with the Figure's location in the otherwise spatial indications of the English preposition, *beyond*, whereas it is absent from the parallel locution, *on the other side of*, as in, *He is beyond/on the other side of the border* (both these locutions—unlike *past* seen above—are otherwise equivalent in establishing a viewpoint location as an external Secondary Reference Object).

A third nongeometric category—in the class that relates one scene component to another—is that of "relative priority", with two members: coequal and main/ancillary. The English verb satellites, *together* and *along*, both indicate joint participation, as seen in, *I jog together/along with him*. But *together* indicates that the Figure and the Ground are co-equal partners in the activity, whereas *along* indicates that the Figure entity is ancillary to the Ground entity, who would be assumed to engage in the activity even if alone (see Talmy, 2000b, chap. 3).

Properties of the Inventory

By our methodology, the universally available inventory of structural spatial elements includes all elements that appear in at least one closed-class, spatial schema in at least one language. These elements may indeed be equivalent in their sheer availability for use in schemas. But beyond that, they appear to differ in their frequency of occurrence across schemas and languages, ranging from very common to very rare. Accordingly, the inventory of elements, and perhaps also that of categories, may have the property of being hierarchical, with entries running from the most to the least frequent. Such a hierarchy suggests asking whether the elements in the inventory, the categories in the inventory, and the elements in each category form fully closed memberships. That is, does the hierarchy end at a sharp lower boundary or trail off indefinitely? With many schemas and languages already examined, our sampling method may have yielded all the commoner elements and categories, but as the process slows down in the discovery of the rarer forms, will it asymptotically approach some complete constituency and distinctional limit in the inventory, or will it be able to go on uncovering sporadic novel forms as they develop in the course of language change?

The latter seems likelier. Exotic elements with perhaps unique occurrence in one or a few schemas in just one language can be noted, including in English. Thus, in referring to location at the interior of a wholly or partly enclosed vehicle, the prepositions *in* and *on* distinguish whether the vehicle lacks or possesses a walkway. Thus, one is in a car but on a bus, in a helicopter but on a plane, in a grain car but on a train, and in a rowboat but on a ship. Further, Fillmore has observed that this *on* also requires that the vehicle be currently in use as transport: *The children were playing*

*in/*on the abandoned bus in the junkyard*. Thus, schema analysis in English reveals the element '(partly) enclosed vehicle with a walkway currently in use as transport'. This is surely one of the rarer elements in schemas around the world, and its existence, along with that of various others that can be found, suggests that indefinitely, many more of them can sporadically arise.

In addition to being only relatively closed at its hierarchically lower end, the inventory may include some categories whose membership seems not to settle down to a small fixed set. One such category may be that of "intrinsic parts". Frequently encountered are the five member elements, 'front', 'side', 'back', 'top', and 'bottom', as found in the English prepositions in, *The cat lay before/beside/behind/atop/beneath the TV*. But languages like Mixtec seem to distinguish a rather different set of intrinsic parts in their spatial schemas (Brugmann & Macaulay, 1986), whereas Makah distinguishes many more and finer parts, such as with its verb suffixes for 'at the ankle' and 'at the groin' (M. Davidson, personal communication, 2000).

Apart from any fuzzy lower boundary and noncoalescing categories, there does appear to exist a graduated inventory of basic spatial elements and categories that is universally available and, in particular, is relatively closed. Bowerman (e.g. 1989) has raised the main challenge to this notion. She notes, for example, that at the same time that children acquiring English learn its *in/on* distinction, children acquiring Korean learn its distinction between *kkita* 'put [Figure] in a snug fit with [Ground]', and *nehta*, 'put [Figure] in a loose fit with [Ground]', she argues that because the elements 'snug fit' and 'loose fit' are presumably rare among spatial schemas across languages, they do not come from any preset inventory, one that might plausibly be innate, but rather are learned from the open-ended semantics of the adult language. My reply is that the spatial schemas of genuinely closed-class forms in Korean may well still be built from the proposed inventory elements, and that the forms she cites are actually open-class verbs. Open-class semantics—whether for space or other domains—seems to involve a different cognitive subsystem, drawing from finer discriminations within a broader perceptual/conceptual sphere. The Korean verbs are perhaps learned at the same age as English space-related, open-class verbs, like *squeeze*. Thus, English-acquiring children probably understand that *squeeze* involves centripetal pressure from encircling or bi-/multilaterally placed Antagonists (typically the arm[s] or hand[s]) against an Agonist that resists the pressure but yields down to some smaller compass where it blocks further pressure, and hence that one can squeeze a teddy bear, a tube of toothpaste, or a rubber ball, but not a piece of string or sheet of paper, juice or sugar or the air, a tabletop, or the corner of a building. Thus, Bowerman's challenge may be directed at the wrong target, leaving the proposed roughly preset inventory of basic spatial building blocks intact.

Basic Elements Assembled into Whole Schemas

The procedure so far has been analytic, starting with the whole spatial schemas expressed by closed-class forms and abstracting from them an inventory of fundamental spatial elements. But the investigation must also include a synthetic procedure: examining the ways in which individual spatial elements are assembled to constitute whole schemas. Something of such an assembly was implicit in the initial discussion of the *across* schema. But an explicit example here can better illustrate this part of the investigation.

Consider the schema represented by the English preposition *past* as in *The ball sailed past my head at exactly 3 p.m*. This schema is built out of the following fundamental spatial elements (from the indicated categories) in the indicated arrangements and relationships: There are two main scene components (members of the "major scene components" category), a Figure and a

Ground (here, the ball and my head, respectively). The Figure is schematizable as a 0-dimensional point (a member element of the "dimension" category). This Figure point is moving (a member element of the "motive state" category). Hence it forms a one-dimensional line (a member of the "dimension" category"). This line constitutes the Figure's "path." The Ground is also schematizable as a 0-dimensional point (a member of the "dimension" category). There is a point P at a proximal remove (a member of the "degree of remove" category) from the Ground point, forming a 1-dimensional line with it (a member of the "dimension" category). This line is parallel (a member of the "relative orientation" category) to the horizontal plane (a member of the "intrinsic parts" category) of the earth-based grid (a member of the major scene components" category). The Figure's path is perpendicular (a member of the "relative orientation" category) to this line. The Figure's path is also parallel to the horizontal plane of the earth-based grid. If the Ground object has a front, side, and back (members of the "intrinsic parts" category), then point P is proximal to the side part. A nonboundary point (a member of the "state of boundedness" category) of the Figure's path becomes coincident (a member of the "degree of remove" category) with point P at a certain point of time.

Note that here the Figure's path must be specified as passing through a point proximal to the Ground because if it instead passed through the Ground point, one would switch from the preposition *past* to *into*, as in, *The ball sailed into my head*, and if it instead passed through some distal point, one might rather say something like, *The ball sailed along some ways away from my head*. And the Figure's path must be specified both as horizontal and as located at the side portion of the Ground because, for example, if the ball were either falling vertically or traveling horizontally at my front, one would no longer say that it sailed "past" my head.

The least understood aspect of the present investigation is what well-formedness conditions, if any, may govern the legality of such combinations. As yet, no obvious principles based, say, on geometric simplicity, symmetry, consistency, or the like are seen to control the patterns in which basic elements assemble into whole schemas. On one hand, some seemingly byzantine combinations, like the schemas seen above for *across* and *past*, occur with some regularity across languages. On the other hand, much simpler combinations seem never to occur as closed-class schemas. For example, one could imagine assembling elements into the following schema: down into a surround that is radially proximal to a center point. One could even invent a preposition, *apit*, to represent this schema. This could then be used, say, in, *I poured water apit my house*, to refer to my pouring water down into a nearby hole dug in the field around my house. But such schemas are not found. Similarly, a number of schematic distinctions in, for example, the domain of rotation, are regularly marked by signed languages, as seen below, and could readily be represented with the inventory elements available to spoken languages, yet they largely do not occur. It could be argued that the spoken language schemas are simply the spatial structures most often encountered in everyday activity. But that would not explain why the additional sign-language schemas—presumably also reflective of everyday experience—do not show up in spoken languages. Besides, the different sets of spatial schemas found in different spoken languages are diverse enough from each other that arguing on the basis of the determinative force of everyday experience is problematic. Something else is at work but it is not yet clear what it is.

Properties and Processes Applying to Whole Spatial Schemas

It was just seen that selected elements of the inventory are combined in specific arrangements to make up the whole schemas represented by closed-class spatial forms. Each such whole schema

is thus a "prepackaged" bundling together of certain elements in a particular arrangement. Each language has in its lexicon a relatively closed set of such prepackaged schemas—a set larger than that of its spatial closed-class forms, because of polysemy. A speaker of the language must select among these schemas in depicting a spatial scene. We now observe that such schemas, though composite, have a certain unitary status in their own right, and that certain quite general properties and processes can apply to them. In particular, certain properties and processes allow a schema represented by a closed-class form to generalize to a whole family of schemas. In the case of a generalizing *property*, all the schemas of a family are of equal priority. On the other hand, a generalizing *process* acts on a schema that is somehow basic, and either extends or deforms it to yield nonbasic schemas. (see Talmy, 2000a, chaps. 1 and 3, 2000b, chap. 5). Such properties and processes are perhaps part of the overall spoken-language system so that any language's relatively closed set of spatial closed-class forms and the schemas that they basically represent can be used to match more spatial structures in a wider range of scenes.

Looking first at generalizing properties of spatial schemas, one such property is that they exhibit a topological or topology-like neutrality to certain factors of Euclidean geometry. Thus, they are magnitude neutral, as seen in such facts as that the *across* schema can apply to a situation of any size, as in, *The ant crawled across my palm/The bus drove across the country*. Further, they are largely shape-neutral, as seen by such facts as that, although the *through* schema requires that the Figure form a path with linear extent, it lets that line take any contour, as in, *I zigzagged/circled through the woods*. And they are bulk-neutral, as seen by such facts as that the *along* schema requires a linear Ground without constraint on the Ground's radial extension, as in, *The caterpillar crawled up along the filament/tree trunk*. Thus, while holding to their specific constraints, schemas can vary freely in other respects and so cover a range of spatial configurations.

Among the generalizing processes that extend schemas, one is that of "extendibility from the prototype," which can actually serve as an alternative interpretation for some forms of neutrality, otherwise just treated under generalizing properties. Thus, in the case of shape, as for the *through* schema above, this schema could alternatively be conceived as prototypically involving a strait path line for the Figure, one that can then be bent to any contour. And, in the case of bulk, as for the *along* schema above, this schema could be thought prototypically to involve a purely 1-dimensional line that then can be radially inflated.

Another such process is "extendibility in ungoverned dimensions." By this process, a scene component of dimensionality *N* in the basic form of a schema can generally be raised in dimensionality to form a line, plane, or volume aligned in a way not conflicting with the schema's other requirements. To illustrate, it was seen earlier under the "type of geometry" category that the English verb satellite *out* has a schema involving a point Figure moving along a radius away from a center point through a continuum of concentric circles, as in, *The boat sailed farther and farther out from the island*. This schema with the Figure idealizable as a point is the basic form. But the same satellite can be used when this Figure point is extended to form a 1-dimensional line along a radius, as in, *The caravan of boats sailed farther and farther out from the island*. And the *out* can again be used if the Figure point were instead extended as a 1-dimensional line forming a concentric circle, as in, *A circular ripple spread out from where the pebble fell into the water.* In turn, such a concentric circle could be extended to fill in the interior plane, as in, *The oil spread out over the water from where it spilled*. Alternatively, the concentric circle could have been extended in the vertical dimension to form a cylinder, as in, *A ring of fire spread out as an advancing wall of flames*. Or again, the circle could have been extended to form a spherical shell, as in, *The balloon I blew into slowly puffed out*. And such a shell can be ex-

tended to fill in the interior volume, as in, *The leavened dough slowly puffed out*. Thus the same form *out* serves for this series of geometric extensions without any need to switch to some different form.

One more schema-extending process is "extendibility across motive states". A schema basic for one motive state and Figure geometry can in general be systematically extended to another motive state and Figure geometry. For example, a closed-class form whose most basic schema pertains to a point Figure moving to form a path can generally serve as well to represent the related schema with a stationary linear Figure in the same location as the path. Thus, probably the most basic *across* schema is actually for a moving point Figure, as in, *The gopher ran across the road*. By the present process, this schema can extend to the static linear Figure schema first seen in, *The board lay across the road*. All the spatial properties uncovered for that static schema hold as well for the present basic dynamic schema, which in fact is the schema in which these properties originally arise.

Among the generalizing processes that deform a schema, one is that of "stretching," which allows a slight relaxing of one of the normal constraints. Thus, in the *across* schema, where the Ground plane is either a ribbon with a long and short axis or a square with equal axes, a static linear Figure or the path of a moving point Figure must be aligned with the short Ground axis or with one of its equal axes. Accordingly, one can say, *I swam across the canal*, and, *I swam across the square pool*, when moving from one side to the other, but one cannot say, **1 swam across the canal*, when moving from one end of the canal to the other. But, by moderately stretching one axis length relative to the other, one might just about be able to say, *I swam across the pool*, when moving from one end to the other of a slightly oblong pool.

Another schema deforming process is that of "feature cancellation," in which a particular complex of elements in the basic schema is omitted. Thus, the preposition *across* can be used in, *The shopping cart rolled across the boulevard and was hit by an oncoming car*, even though one feature of the schema—'terminal point coincides with the distal edge of the Ground ribbon'—is canceled from the Figure's path. Further, both this feature and the feature, 'beginning point coincides with the proximal edge of the Ground ribbon', are canceled in, *The tumbleweed rolled across the prairie for an hour*. Thus, the spoken language system includes a number of generalizing properties and processes that allow the otherwise relatively closed set of abstracted or basic schemas represented in the lexicon of any single language to be applicable to a much wider range of spatial configurations.

SPATIAL STRUCTURING IN SIGNED LANGUAGE

All the preceding findings on the linguistic structuring of space have been based on the patterns found in spoken languages. The inquiry into the fundamental concept structuring system of language leads naturally to investigating its character in another major body of linguistic realization, signed language. The value in extending the inquiry in this way would be to discover whether the spatial structuring system is the same or is different in certain respects across the two language modalities, with either discovery having major consequences for cognitive theory.

In this research extension, a problematic issue is exactly what to compare between spoken and signed language. The two language systems appear to subdivide into somewhat different sets of subsystems. Thus, heuristically, the generalized spoken language system can be thought to consist of (a) an open-class or lexical subsystem (generally representing conceptual content); (b) a closed-class or grammatical subsystem (generally representing conceptual structure); (c) a

gradient subsystem of "vocal dynamics" (including loudness, pitch, timbre, rate, distinctness, unit separation); and (d) an accompanying somatic subsystem (including facial expression, gesture, and "body language"). On the other hand, by one provisional proposal, the generalized sign language system might instead divide up into the following: (a) a subsystem of lexical forms (including noun, verb, and adjective signs); (b) an "inflectional" subsystem (including modulations of lexical signs for person, aspect); (c) a subsystem of size-and-shape specifiers (or SASS; (d) a subsystem of so-called "classifier expressions"; (e) a gestural subsystem (along a gradient of incorporation into the preceding subsystems); (f) a subsystem of face, head, and torso representations; (g) a gradient subsystem of "bodily dynamics" (including amplitude, rate, distinctness, unit separation); and (h) an associated or overlaid somatic subsystem (including further facial expression and "body language"). In particular here, the subsystem of classifier expressions—which is apparently present in all signed languages—is a formally distinct subsystem dedicated solely to the schematic structural representation of objects moving or located with respect to each other in space (see Emmorey, 2002; Liddell, chap. 9, this volume). Each classifier expression, perhaps generally corresponding to a clause in spoken language, represents a so-conceived event of motion or location.[4]

The research program of comparing the representation of spatial structure across the two language modalities ultimately requires considering the two whole systems and all their subsystems. But the initial comparison, the one adopted here, should be between those portions of each system most directly involved with the representation of spatial structure. In spoken language, this is that part of the closed-class subsystem that represents spatial structure and, in signed language, it is the subsystem of classifier constructions. Spelled out, the shared properties that make this initial comparison apt include the following. First, of course, both subsystems represent objects relating to one another in space. Second, in terms of the functional distinction between "structure" and "content" described earlier, each of the subsystems is squarely on the structural side. In fact, analogous structure-content contrasts occur. Thus, the English closed-class form *into* represents the concept of a path that begins outside and ends inside an enclosure in terms of schematic structure, in contrast with the open-class verb, *enter*, that represents the same concept in terms of substantive content (see Talmy, 2000a, chap. 1 for this structure-content distinction). Comparably, any of the formations within a classifier expression for such an outside-to-inside path represents it in terms of its schematic structure, in contrast with the unrelated lexical verb sign that can be glossed as 'enter'. Third, in each subsystem, a schematic structural form within an expression in general can be semantically elaborated by a content form that joins or replaces it within the same expression. Thus, in the English sentence, *I drove it (the motorcycle) in (to the shed)*, the parenthesized forms optionally elaborate on the otherwise schematically represented Figure and Ground. Comparably, in the ASL sentence, *(SHED) (MOTORCYCLE) vehicle-move-into-enclosure*, the optionally signed forms within parentheses elaborate on the otherwise schematic Figure and Ground representations within the hyphenated classifier expression.

To illustrate the classifier system, a spatial event that English could express as, *The car drove past the tree*, could be expressed in ASL as follows: The signer's dominant hand, used to represent the Figure object, here has a 3-handshape (index and middle fingers extended forward, thumb up) to represent a land vehicle. The nondominant hand, used to represent the Ground object, here involves an upright 5-handshape (forearm held upright with the five fingers extended upward and spread apart) to represent a tree. The dominant hand is moved horizontally across the signer's torso and past the nondominant forearm. Further though, this basic form could be

modified or augmented to represent additional particulars of the referent spatial event. Thus, the dominant hand can show additional characteristics of the path. For example, the hand could move along a curved path to indicate that the road being followed was curved, it could slant upward to represent an uphill course, or both could be shown together. The dominant hand can additionally show the manner of the motion. For example, as it moves along, it could oscillate up and down to indicate a bumpy ride, or move quickly to indicate a swift pace, or both could be shown together, as well as with the preceding two path properties. And the dominant hand can show additional relationships of the Figure to the Ground. For example, it could pass nearer or farther from the nondominant hand to indicate the car's distance from the tree when passing it, it could make the approach toward the nondominant hand longer (or shorter) than the trailing portion of the path to represent the comparable relationship between the car's path and the tree, or it could show both of these together or, indeed, with all the preceding additional characteristics.

The essential finding of how signed language differs from spoken language is that it more closely parallels what appear to be the structural characteristics of scene parsing in visual perception. This difference can be observed in two venues, the universally available spatial inventory and the spatial expression. These two venues are discussed next in turn.

In the Inventory

The inventory of forms for representing spatial structure available to the classifier subsystem of signed language has a greater total number of fundamental elements, a greater number of categories, and generally a greater number of elements per category than the spoken language, closed-class inventory. Although many of the categories and their members seem to correspond across the two inventories, the signed language inventory has an additional number of categories and member elements not present in the spoken language inventory. Comparing the membership of the corresponding categories in terms of discrete elements, the number of basic elements per category in signed language actually exhibits a range: from being the same as that for spoken language to being very much greater. Further, though, although the membership of some categories in signed language may well consist of discrete elements, that of others appears to be gradient. Here, any procedure of tallying some fixed number of discrete elements in a category must give way to determining the approximate fineness of distinctions that can be practicably made for that category. So even though some corresponding categories across the two language modalities may otherwise be quite comparable, their memberships can be of different types, discrete versus analog. Altogether, then, given its greater number of categories, generally larger membership per category, and a frequently gradient type of membership, the inventory of forms for building a schematic spatial representation available to the classifier subsystem of signed language is more extensive and finer than for the closed-class subsystem of spoken language. This greater extensiveness and finer granularity of spatial distinctions seems more comparable to that of spatial parsing in visual perception.

The following are some spatial categories in common across the two language modalities, but with increasing disparity in size of membership. First, some categories appear to be quite comparable across the two modalities. Thus, both the closed-class subsystem of spoken language and the classifier subsystem of signed language structurally segment a scene into the same three components, a Figure, a Ground, and a secondary Reference Object. Both subsystems represent the category of dimensionality with the same four members—a point, a line, a plane, and a volume. And both mark the same two degrees of boundedness: bounded and unbounded.

For certain categories, signed language has just a slightly greater membership than does spoken language. Thus, for motive state, signed language structurally represents not only moving and being located, but also remaining fixedly located—a concept that spoken languages typically represent in verbs but not in their spatial preposition-like forms.

For some other spatial categories, signed language has a moderately greater membership than spoken language. In some of these categories, the membership is probably gradient, but without the capacity to represent many fine distinctions clearly. Thus, signed language can apparently mark moderately more degrees of "remove" than spoken language's four or five members in this category. It can also apparently distinguish moderately more path lengths than the two—short and long—that spoken language marks structurally (as in English, *The bug flew right/way up there*). And although spoken language can mark at most three distinctions of relative orientation—parallel, perpendicular, and oblique—signed language can distinguish a moderately greater number, for example, in the elevation of a path's angle above the horizontal, or in the angle of the Figure's axes to that of the Ground (e.g. in the placement of a rod against a wall).

Finally, there are some categories for which signed language has an indefinitely greater membership than spoken language. Thus, while spoken language structurally distinguishes some four path contours as seen in the section beginning on page 172 (*Categories Pertaining to the Relation of One Scene Component to Another*), signed language can represent perhaps indefinitely many more, including zigzags, spirals, and ricochets. And for the category "locus within referent space," spoken language can structurally distinguish perhaps at most three loci relative to the speaker's location—'here', 'there', and 'yonder'—whereas sign language can distinguish indefinitely many more within sign space.

Apart from membership differences across common categories, signed language represents some categories not found in spoken language. One such category is the relative lengths of a Figure's path before and after encounter with the Ground. Or again, signed language can represent not only the category of "degree of dispersion" (which spoken language was seen to represent on page 172), but also the category "pattern of distribution." Thus, in representing multiple Figure objects dispersed over a planar surface, it could in addition, structurally indicate that these Figure objects are linear (as with drying spaghetti over a table) and are arrayed in parallel alignment, crisscrossing, or in a jumble.

This difference in the number of structurally marked spatial category and element distinctions between spoken and signed language can be highlighted with a closer analysis of a single spatial domain, that of rotational motion. As seen earlier, the closed-class subsystem in spoken language basically represents only one category within this domain, that of "orientation of spin axis," and within this category distinguishes only two member elements, vertical and horizontal. These two member elements are expressed, for example, by the English verb satellites *around* and *over* as in, *The pole spun around/toppled over.* ASL, by contrast, distinguishes more degrees of spin axis orientation and, in addition, marks several further categories within the domain of rotation. Thus, it represents the category of "amount of rotation" and within this category can readily distinguish, say, whether the arc of a Figure's path is less than, exactly, more than, or many times one full circuit. These are differences that English might offer for inference only from the time signature, as in, *I ran around the house for 20 seconds/in 1 minute/for 2 minutes/for hours*, while using the same single spatial form, *around*, for all these cases. Further, while English would continue using just *around* and *over*, ASL further represents the category of "relation of the spin axis to an object's geometry" and marks many distinctions within this category. Thus, it can structurally mark the spin axis as being located at the center of the turning object, as

well as whether this object is planar like a CD disk, linear like a propeller, or an aligned cylinder like a pencil spinning on its point. It distinguishes this from the spin axis located at the boundary of the object, as well as whether the object is linear like the "hammer" swung around in a hammer toss, a transverse plane like a swinging gate, or a parallel plane like a swung cape. And it further distinguishes these from the spin axis located at a point external to the object, as well as whether the object is pointlike, like the earth around the sun, or linear, like a spinning hoop.

Finally, ASL can structurally represent the category of "uniformity of rotation" with its two member elements, uniform and nonuniform, where English could mark this distinction only with an open-class form, like the verbs in, *The hanging rope spun/twisted around*, while once again continuing with the same single structural closed-class form, *around*. Thus, although spoken language structurally marks only a minimal distinction of spin axis orientation throughout all these geometrically distinct forms of rotation, signed language marks more categories as well as finer distinctions within them, and a number of these appear to be distinguished as well by the visual parsing of rotational movement.

To expand on the issue of gradience, numerous spatial categories in the classifier subsystem of signed language, for example, many of the 30 spatial categories listed on page 186 (*Many More Elements/Categories Representable Within a Single Expression*), are gradient in character. Spoken language has a bit of this, as where the vowel length of a *waaay* in English can be varied continuously. But the preponderant norm is the use of discrete spatial elements, typically incorporated into distinct morphemes. For example, insofar as they represent degree of remove, the separate forms in the series, *on/next to/near/away from*, represent increasing distance in what can be considered quantal jumps. That is, the closed-class subsystem of spoken language is a type of cognitive system whose basic organizing principle is that of the recombination of discrete elements (i.e., the basic conceptual elements whose combinations, in turn, comprise the meanings of discrete morphemic forms). By contrast, the classifier subsystem of signed language is the kind of cognitive system whose basic organizing principle largely involves gradience, much as would seem to be the case as well for the visual and motor systems. In fact, within a classifier expression, the gradience of motor control and of visual perception are placed in sync with each other (for the signer and the addressee, respectively), and conjointly put in the service of the linguistic system.

Although this section provides evidence that the classifier subsystem in signed language diverges from the schematizing of spoken language in the direction of visual parsing, one must further observe that the classifier subsystem is also not "simply" a gestural system wholly iconic with visual perception. Rather, it incorporates much of the discrete, categorial, symbolic, and metaphoric character that is otherwise familiar from the organization of spoken language. Thus, as already seen above, spatial representation in the classifier subsystem does fall into categories, and some of these categories contain only a few discrete members; in fact, several of these are much the same as in spoken language. Second, the handshapes functioning as classifiers for the Figure, manipulator, or instrument within classifier expressions are themselves discrete (nongradient) members of a relatively closed set. Third, many of the hand movements in classifier expressions represent particular concepts or metaconcepts and do not mimic actual visible movements of the represented objects. Here is a small sample of this property. After one lowers one's two extended fingers to represent a knife dipping into peanut butter—or all one's extended fingers in a curve to represent a scoop dipping into coffee beans—one curls back the fingertips while moving back up to represent the instrument's "holding" the Figure, even though the instrument in question physically does nothing of the sort. Or again, the free fall of a Figure is repre-

sented not only by a downward motion of the dominant hand in its classifier handshape, but also by an accompanying rotation of the hand, whether or not the Figure in fact rotated in just that way during its fall. As another example, a Figure is shown as simply located at a spot in space by the dominant hand in its classifier handshape being placed relaxedly at a spot in signing space, and as remaining fixedly at its spot by the hand's being placed tensely and with a slight final jiggle, even though these two conceptualizations of the temporal character of a Figure's location are visually indistinguishable. Or, further, a (so-conceivedly) random spatial distribution of a mass or multiplex Figure along a line, over a plane, or through a volume is represented by the Figure hand being placed with a loose nonconcerted motion, typically three times, at uneven spacings within the relevant n-dimensional area, even though that particular spacing of three exemplars may not correspond to the actual visible distribution. And finally, a classifier hand's type of movement can indicate whether this movement represents the actual path of the Figure, or is to be discounted. Thus, the two flat hands held with palms toward the signer, fingertips joined, can be moved steadily away to represent a wall's being slid progressively outward (as to expand a room), or instead can be moved in a quick up-and-down arc to a point further away to represent a wall relocated to a further spot, whatever its path from the starting location. That is, the latter quick arc movement represents a metaconcept: that the path followed by the hands does not represent the Figure's actual path and is to be disregarded from calculations of iconicity. All in all, then, the classifier subsystem presents itself as a genuine linguistic system, but one having more extensive homology with the visual structuring system than spoken language has.

In the Expression

The second venue, that of any single spatial expression, exhibits further respects in which signed language differs from spoken language in the apparent direction of visual scene parsing. Several of these are outlined next.

Iconic Representation in the Expression

Spatial representation in signed classifier expressions is iconic with scene parsing in visual perception in at least the following four respects.

Iconic Clustering of Elements and Categories. The structural elements of a scene of motion are clustered together in the classifier subsystem's representation of them in signed language more as they seem to be clustered in perception. When one views a motion event, such as a car driving bumpily along a curve past a tree, it is perceptually the same single object, the car, that exhibits all of the following characteristics: it has certain object properties as a Figure, it moves, it has a manner of motion, it describes a path of a particular contour, and it relates to other surrounding objects (the Ground) in its path of motion. The Ground object or objects are perceived as separate. Correspondingly, the classifier subsystem maintains exactly this pattern of clustering. It is the same single hand, the dominant hand, that exhibits the Figure characteristics, motion, manner, path contour, and relations to a Ground object. The other hand, the nondominant, separately represents the Ground object.

All spoken languages diverge to a greater or lesser extent from this visual fidelity. Thus, consider one English counterpart of the event, the sentence, *The car bumped along past the tree*. Here, the subject nominal, *the car*, separately represents the Figure object by itself. The verb complex clusters together the representations of the verb and the satellite: The verb *bumped* rep-

resents both the fact of motion and the manner of motion together, while its sister constituent, the satellite, *along*, represents the presence of a path of translational motion. The prepositional phrase clusters together the preposition, *past*, representing the path conformation, and its sister constituent, the nominal, *the tree*, representing the Ground object. It in fact remains a mystery at this point in the investigation why all spoken languages using a prepositionlike constituent to indicate path always conjoin it with the Ground nominal and basically never with the Figure nominal[5], even though the Figure is what executes the path, and is so represented in the classifier construction of signed language.

Iconic Representation of Object versus Action. The classifier subsystem of signed language appears to be iconic with visual parsing not only in its clustering of spatial elements and categories, as just seen, but largely also in its representation of them. For example, it marks one basic category opposition, that between an entity and its activity, by using an object like the hand to represent an object, and motion of the hand to represent motion of the object. More specifically, the hand or other body part represents a structural entity (such as the Figure)—with the body part's configuration representing the identity or other properties of the entity—while movements or positionings of the body part represent properties of the entity's motion, location, or orientation. For example, the hand could be shaped flat to represent a planar object (e.g., a sheet of paper), or rounded to represent a cup-shaped object. And, as seen, any such handshape as Figure could be moved along a variety of trajectories that represent particular path contours.

But an alternative to this arrangement could be imagined. The handshape could represent the path of a Figure—e.g., a fist to represent a stationary location, the outstretched fingers held flat together to represent a straight line path, the fingers in a curved plane for a curved path, and the fingers alternately forward and backward for a zigzag path. Meanwhile, the hand movement could represent the Figure's shape—e.g., the hand moving in a circle to represent a round Figure and in a straight line for a linear Figure. However, no such mapping of referents to their representations is found.[6] Rather, the mapping in signed language is visually iconic: it assigns the representation of a material object in a scene to a material object in a classifier complex, for example, the hand, and the representation of the movements of that object in the scene to the movements of the hand.

No such iconic correspondence is found in spoken language. Thus, although material objects are prototypically expressed by nouns in English, they are instead prototypically represented by verb roots in Atsugewi (see Talmy, 2000b, chap. 1). And although path configurations are prototypically represented in Spanish by verbs, this is done by prepositions and satellites in English.

Iconic Representation of Further Particular Categories. Finer forms of iconicity are also found within each branch of the broad entity–activity opposition. In fact, most of the spatial categories listed on page 186 that a classifier expression can represent are largely iconic with visual parsing. Thus, an entity's form is often represented by the form of the hand(s), its size by the compass of the hand(s), and its number by the number of digits or hands extended. And, among many other categories in the list, an entity's motive state, path contour, path length, manner of motion, and rate of motion are separately represented by corresponding behaviors of the hand(s).

Spoken language, again, has only a bit of comparable iconicity. As examples, path length can be iconically represented in English by the vowel length of *way*, as in, *The bird flew waay/waaaay/waaaaaay up there*. Path length can also be semi-iconically represented by the

number of iterations, as in, *The bird flew up/up up/up up up and away*. Perhaps the number of an entity can be represented in some spoken language by a closed-class reduplication. But the great majority of spoken, closed-class representations show no such iconicity.

Iconic Representation of the Temporal Progression of a Trajectory. The classifier subsystem is also iconic with visual parsing in its representation of temporal progression, specifically, that of a Figure's path trajectory. For example, when an ASL classifier expression represents "The car drove past the tree", the "past" path is shown by the Figure hand progressing from the nearer side of the Ground arm to a point beside it and then on to its further side, much like the path progression one would see on viewing an actual car passing a tree. By contrast, nothing in any single, closed-class path morpheme in a spoken language corresponds to such a progression. Thus, the *past* in, *The car drove past the tree*, is structurally a single indivisible linguistic unit, a morpheme, whose form represents no motion ahead in space. Iconicity of this sort can appear in spoken language only where a complex path is treated as a sequence of subparts, each with its own morphemic representation, as in, *I reached my hand down around behind the clothes hamper to get the vacuum cleaner.*

A Narrow Time-Space Aperture in the Expression

Another way that the classifier expression in signed language may be more like visual perception is that it appears to be largely limited to representing a narrow time-space aperture. The tentative principle is that a classifier complex readily represents what would appear within a narrow scope of space and time if one were to zoom in with one's scope of perception around a Figure object, but little outside that narrowed scope. Hence, a classifier expression readily represents (a) the Figure object as to its shape or type; (b) any manipulator or instrument immediately adjacent to the Figure; (c) the Figure's current state of Motion (motion or locatedness); (d) the contour or direction of a moving Figure's path; and (e) any Manner exhibited by the Figure as it moves. However, a classifier expression can little represent related factors occurring outside the current time, such as a prior cause or a follow-up consequence. And it can little represent even concurrent factors if they lie outside the immediate spatial ambit of the Figure, factors like the ongoing causal activity of an intentional Agent or other external instrumentality.

By contrast, spoken languages can largely represent such nonlocal spatiotemporal factors within a single clause. In particular, such representation occurs readily in satellite-framed languages such as English (see Talmy, 2000b, chaps. 1 and 3). In representing a Motion event, this type of language regularly employs the satellite constituent (e.g., the verb particle in English) to represent the Path, and the main verb to represent a "co-event." The co-event is ancillary to the main Motion event and relates to it as its precursor, enabler, cause, manner, concomitant, consequence, or the like.

Satellite-framed languages can certainly use this format to represent within-aperture situations that can also be represented by a classifier complex. Thus, English can say within a single clause—and ASL can sign within a single classifier expression—a motion event in which the Figure is moved by an adjacent manipulator, as in, *I pinched some moss up off the rock*, and, *I pulled the pitcher along the counter*, or in which the Figure is moved by an adjacent instrument, as in, *I scooped jelly beans up into the bag*. The same holds for a situation in which a moving Figure exhibits a concurrent Manner, as in, *The cork bobbed past the seaweed*.

But English can go on to use this same one-clause format to include the representation of co-events outside the aperture, either temporally or spatially. Thus, temporally, English can include the representation of a prior causal event, as in, *I kicked the football over the goalpost* (first I kicked the ball, then it moved over the goalpost). And it can represent a subsequent event, as in, *They locked the prisoner into his cell* (first they put him in, then they locked it). But ASL cannot represent such temporally extended event complexes within a single classifier expression. Thus, it *can* represent the former sentence with a succession of two classifier expressions: first, flicking the middle finger of the dominant hand across the other hand's upturned palm to represent the component event of kicking an object, and next moving the extended index finger of the dominant hand axially along a line through the space formed by the up-pointing index and little fingers of the nondominant hand, representing the component event of the ball's passing over the goalpost. But it cannot represent the whole event complex within a single expression—say, by flicking one's middle finger against the other hand whose extended index finger then moves off axially along a line.

Further, English can use the same single-clause format to represent events with spatial scope beyond a narrow aperture, for example, an Agent's concurrent causal activity outside any direct manipulation of the Figure, as in, *I walked/ran/drove/flew the memo to the home office*. Again, ASL cannot represent the whole event complex of, say, *I ran the memo to the home office*, within a single classifier expression. Thus, it could not, say, adopt the classifier for holding a thin flat object (thumb pressed against flat fingers) with the dominant hand and placing this atop the nondominant hand, while moving forward with it as it shows alternating strokes of two downward pointed fingers to indicate running (or concurrently with any other indication of running). Instead a sequence of two expressions would likely be used, for example, first one for taking a memo, then one for a person speeding along.[7]

Although the unacceptable examples above have been devised, they nevertheless show that it is physically feasible for a signed language to represent factors related to the Figure's Motion outside its immediate space–time ambit. Accordingly, the fact that signed languages, unlike spoken languages, do avoid such representations may follow from deeper structural causes, such as a greater fidelity to the characteristics of visual perception.

However apt, though, such an account leaves some facts still needing explanation. Thus, on the one hand, it makes sense that the aperture of a classifier expression is limited temporally to the present moment; this accords with our usual understanding of visual perception. But it is not clear why the aperture is also limited spatially. Visual perception is limited spatially to a narrow scope only when attention is being focused, but is otherwise able to process a wide-scoped array. Why then should classifier expressions avoid such wide spatial scope as well? Further, sign languages *can* include representation of the Ground object within a single classifier expression (typically with the nondominant hand), even where that object is not adjacent to the Figure.

More Independent Distinctions Representable in the Expression

This third property of classifier expressions has two related aspects—the large number of different elements and categories that can be represented together, and their independent variability—and these are treated in succession next.

Many More Elements/Categories Representable Within a Single Expression. Although the spatiotemporal aperture that can be represented within a single classifier expression may be

small compared to that in a spoken-language clause, the number of distinct factors within that aperture that can be represented is enormously greater. In fact, perhaps the most striking difference between the signed and the spoken representation of space in the expression is that the classifier system in signed language permits the representation of a vastly greater number of distinct spatial categories simultaneously and independently. A spoken language like English can separately represent only up to four or five different spatial categories with closed-class forms in a single clause. As illustrated in the sentence, *The bat flew way back up into its niche in the cavern*, the verb is followed in turn by: (a) a slot for indication of path length (with three members: *zero* for 'neutral', *way* for 'relatively long', *right* for 'relatively short'); (b) a slot for state of return (with two members: *zero* for 'neutral', *back* for 'return'); (c) a slot for displacement within the earth-frame (with four members: *zero* for 'neutral', *up* for 'positive vertical displacement', *down* for 'negative vertical displacement', *over* for 'horizontal displacement'); (d) a slot for geometric conformation (with many members, including *in*, *across*, *past*); and (e) perhaps a slot for motive state and vector (with two members: *zero* for 'neutral between location AT and motion TO' as seen in *in/on*, and *-to* for 'motion TO' as seen in *into/onto*). Even a polysynthetic language like Atsugewi has closed-class slots within a single clause for only up to six spatial categories: *path conformation combined with Ground type*, *path length*, *vector*, *deixis*, *state of return*, and *cause or manner*. In contrast, by one tentative count, ASL has provision for the separate indication of 30 different spatial categories. These categories do exhibit certain co-occurence restrictions, they differ in obligatoriness or optionality, and it is unlikely, perhaps impossible, for all 30 of them to be represented at once. Nevertheless, a sizable number of them can be represented in a single classifier expression and varied independently there. Table 8.1 below lists the spatial categories that I have provisionally identified as available for concurrent independent representation. The guiding principle for positing a category has been that its elements are mutually exclusive: different elements in the same category cannot be represented together in the same classifier expression. If certain elements can be concurrently represented, they belong to different categories. Following this principle has, on one hand, involved joining together what some sign language analyses have treated as separate factors. For example, the first category below covers equally the representation of Figure, instrument, or manipulator (handling classifier), because these three kinds of elements apparently cannot be separately represented in a single expression—one or another of them must be selected. On the other hand, the principle requires making distinctions within some categories that spoken languages treat as uniform. Thus, the single "manner" category of English must be subdivided into a category of "divertive manner" (e.g. moving along with an up-down bump) and a category of "dynamic manner" (e.g. moving along rapidly) because these two factors can be represented concurrently and varied independently.

It seems probable that something more on the order of this number of spatial categories are concurrently analyzed out by visual processing on viewing a scene than the much smaller number present in even the most extreme spoken language patterns.

Elements/Categories Independently Variable in the Expression—Not in Prepackaged Schemas. The signed–spoken language difference just presented was mainly considered for the sheer number of distinct spatial categories that can be represented together in a single classifier expression. Now, though, we stress the corollary: their independent variability. That is, apart from certain constraints involving co-occurrence and obligatoriness in a classifier expression, a signer can generally select a category for inclusion independently of other categories, and select a member element within each category independently of other selections. For example, a clas-

TABLE 8.1

Spatial Categories Potentially Able to Be Represented Concurrently in a Classifier Expression (Working List)

A. Entity properties
   1. Identity (form or semantic category) of Figure/instrument/manipulator;
   2. identity (form or semantic category) of Ground;
   3. magnitude of some major entity dimension;
   4. magnitude of a transverse dimension;
   5. number of entities.

B. Orientation properties
   6. An entity's rotatedness about its left–right axis ("pitch");
   7. an entity's rotatedness about its front–back axis ("roll");
   8. a. an entity's rotatedness about its top–bottom axis ("yaw");
      b. an entity's rotatedness relative to its path of forward motion.

C. Locus properties
   9. locus within sign space.

D. Motion properties
   10. Motive state (moving/resting/fixed);
   11. internal motion (e.g., expansion/contraction, form change, wriggle, swirling);
   12. confined motion (e.g., straight oscillation, rotary oscillation, rotation, local wander);
   13. translational motion.

E. Path properties
   14. State of continuity (unbroken/saltatory);
   15. contour of path;
   16. state of boundedness (bounded/unbounded);
   17. length of path;
   18. vertical height;
   19. horizontal distance from signer;
   20. left-right positioning;
   21. up-down angle ("elevation");
   22. left-right angle ("direction");
   23. transitions between motion and stationariness (e.g., normal, decelerated, abrupt as from impact).

F. Manner properties
   24. divertive manner;
   25. dynamic manner.

G. Relations of Figure or Path to Ground
   26. path's conformation relative to Ground;
   27. relative lengths of path before and after encounter with Ground;
   28. Figure's path relative to the Path of a moving Ground;
   29. Figure's proximity to Ground;
   30. Figure's orientation relative to Ground.

sifier expression can separately include and independently vary a path's contour, length, vertical angle, horizontal angle, speed, accompanying manner, and relation to the Ground object.

By contrast, it was seen earlier that spoken languages largely bundle together a choice of spatial member elements within a selection of spatial categories for representation within the single complex schema that is associated with a closed-class morpheme. The lexicon of each spoken language will have available a certain number of such "prepackaged" spatial schemas, and the speaker must generally choose from among those to represent a spatial scene, even where the fit is not exact. The system of generalizing properties and processes seen in the section beginning on page 175 (*Properties and Processes Applying to Whole Spatial Schemas*) that apply to the set

of basic schemas in the lexicon (including their plastic extension and deformation) may exist to compensate for the prepackaging and closed stock of the schemas in any spoken language. Thus, what are largely semantic components within a single morpheme in spoken language correspond to what can be considered separate, individually controllable morphemes in the signed classifier expression.

The apparent general lack in classifier expressions of prepackaging, of a fixed set of discrete basic schemas, or of a system for generalizing, extending, or deforming such basic schemas may well accord with comparable characteristics of visual parsing. That is, the visual processing of a viewed scene may tend toward the independent assessment of spatial factors without much pre-packeting of associated factors or of their plastic alteration. If shown to be the case, then signed language will once again prove to be closer to perceptual spatial structuring than spoken language is.

COGNITIVE IMPLICATIONS OF SPOKEN/ SIGNED LANGUAGE DIFFERENCES

The preceding comparison of the space-structuring subsystems of spoken and of signed language has shown a number of respects in which these are similar and in which they are different. It can be theorized that their common characteristics are the product of a single neural system, what can be assumed to be the core language system, although each set of distinct characteristics results from the activity of some further distinct neural system. These ideas are outlined next.

Where Signed and Spoken Language Are Alike

We can first summarize and partly extend the properties above found to hold both in the closed-class subsystem of spoken language and in the classifier subsystem of signed language. Both subsystems can represent multifarious and subtly distinct spatial situations—that is, situations of objects moving or located with respect to each other in space. Both represent such spatial situations schematically and structurally. Both have basic elements that in combination make up the structural schematizations. Both group their basic elements within certain categories that themselves represent particular categories of spatial structure. Both have certain conditions on the combination of basic elements and categories into a full structural schematization. Both have conditions on the co-occurrence and sequencing of such schematizations within a larger spatial expression. Both permit semantic amplification of certain elements or parts of a schematization by open-class or lexical forms outside the schema. And in both subsystems, a spatial situation can often be conceptualized in more than one way, so that it is amenable to alternative schematizations.

Where Spoken and Signed Language Differ

Beside the preceding commonalities, though, the two language modalities have been seen to differ in a number of respects. First, they appear to divide up into somewhat different sets of subsystems without clear one-to-one match-ups. Accordingly, the spatial portion of the spoken language, closed-class subsystem and the classifier subsystem of signed language may not be exactly corresponding counterparts, but only those parts of the two language modalities closest to each other in the representation of schematic spatial structure. Second, within this initial com-

parison, the classifier subsystem seems closer to the structural characteristics of visual parsing than the closed-class subsystem in all of the following ways: It has more basic elements, categories, and elements per category in its schematic representation of spatial structure. Its category membership exhibits much more gradient representation, in addition to discrete representation. Its elements and categories exhibit more iconicity with the visual in the pattern in which they are clustered in an expression, in their observance of an object/action distinction, in their physical realization, and in their progression through time. It can represent only a narrow temporal aperture in an expression (and only a narrow spatial aperture as well, although this difference from spoken language might not reflect visual fidelity). It can represent many more distinct elements and categories together in a single expression. It can more readily select categories and category elements independently of each other for representation in an expression. And it avoids prepackaged, category-element combinations as well as generalizations of their range and processes for their extension or deformation.

A New Neural Model

In its strong reading, the Fodor–Chomsky model relevant here is of a complete inviolate language module in the brain, one that performs all and only the functions of language without influence from outside itself—a specifically linguistic "organ." But the evidence assembled here challenges such a model. What has here been found is that two different linguistic systems, the spoken and the signed, both of them undeniably forms of human language, share extensive similarities but, crucially, also exhibit substantial differences in structure and organization. A new neural model can be proposed that is sensitive to this finding. We can posit a "core" language system in the brain, more limited in scope than the Fodor-Chomsky module, that is responsible for the properties and performs the functions found to be in common across both the spoken and the signed modalities. In representing at least spatial structure, this core system would then further connect with two different outside brain systems responsible, respectively, for the properties and functions specific to each of the two language modalities. It would thus be the interaction of the core linguistic system with one of the outside systems that would underlie the full functioning of each of the two language modalities.

The particular properties and functions that the core language system would provide would include all the spoken–signed language properties found in the section beginning on on page 188 (*Cognitive Implications of Spoken/Signed Language Differences*) specific to spatial representation, though presumably in a more generic form. Thus, the core language system might have provision for: (a) using individual unit concepts as the basis for representing broader conceptual content; (b) grouping individual concepts into categories; (c) associating individual concepts with overt physical representations, whether vocal or manual; (d) combining individual concepts, and their physical representations, under certain constraints to represent a conceptual complex; and (e) establishing a subset of individual concepts as the basic schematic concepts that, in combinations, represent conceptual structure.

When in use for signed language, this core language system might then further connect with particular parts of the neural system for visual perception. I previously called attention to the already great overlap of structural properties between spoken language and visual perception (see Talmy, 2000a, chap. 2), which might speak to some neural connection already in place between the core language system and the visual system. Accordingly, the proposal here is that in the case of signed language, still further connections are brought into play, ones that might underlie the finer granularity, iconicity, gradience, and aperture limitations we have seen in signed spatial representations.

When in use for spoken language, the core language system might further connect with a putative neural system responsible for some of the characteristics present in spoken spatial representations but absent from signed ones. These could include the packeting of spatial elements into a stable closed set of patterned combinations, and a system for generalizing, extending, and deforming the packets. It is not clear why such a further system might otherwise exist but, very speculatively, one might look to see if any comparable operations hold, say, for the maintenance and modification of motor patterns.

The present proposal of a more limited core language system connecting with outlying subsystems for full language function seems more consonant with contemporary neuroscientific findings that relatively smaller neural assemblies link up in larger combinations in the subservience of any particular cognitive function. In turn, the proposed core language system might itself be found to consist of an association and interaction of still smaller units of neural organization, many of which might in turn participate in subserving more than just language functions.

ENDNOTES

[1]The present version of this ongoing research supersedes the version in Talmy (2001).

[2]I here approach signed language from the perspective of spoken language because it is not at this point an area of my expertise. For their help with my questions on signed language, my thanks to Paul Dudis, Karen Emmorey, Samuel Hawk, Nini Hoiting, Marlon Kuntze, Scott Liddell, Stephen McCullough, Dan Slobin, Ted Suppala, Alyssa Wolf, and others, who are not responsible for my errors and oversights.

[3]As it happens, most motion prepositions in English have a polysemous range that covers both the unbounded and the bounded sense. Thus, *through*, as in, *I walked through the tunnel for 10 minutes*, refers to traversing an unbounded portion of the tunnel's length, whereas in, *I walked through the tunnel in 20 minutes*, it refers to traversing the entire bounded length.

[4]The "classifier" label for this subsystem—originally chosen because its constructions largely include a classifier-like handshape—can be misleading, because it names the whole expression complex for just one of its components. An apter term might be the *motion-event subsystem*.

[5]As the only apparent exception, a "demoted Figure" (see Talmy, 2000b, chap. 1) can acquire either of two "demotion particles"—e.g., English *with* and *of*—that mark whether the Figure's path had a "TO" or a "FROM" vector, as seen in, *The fuel tank slowly filled with gas/drained of its gas*.

[6]The size and shape specifiers (SASS) in signed languages do permit movement of the hands to trace out an object's contours, but the hands cannot at the same time adopt a shape representing the object's path.

[7]The behavior here of ASL cannot be explained away on the grounds that it is simply structured like a verb-framed language, because such spoken languages typically *can* represent concurrent Manner outside a narrow aperture, in effect saying something like: "I walking/running/driving/flying carried the memo to the home office".

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III

Classifier Constructions and Gesture

9

Sources of Meaning in ASL Classifier Predicates[1]

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Verbs capable of being directed in space were initially called *directional verbs* (Fischer & Gough, 1978) or *multidirectional verbs* (Friedman, 1976). By the mid-1970s, ASL researchers had identified a category of signs with characteristics that appeared to distinguish them from other directional signs. Identifying this class of signs was the first attempt at subdividing the class of directional verbs. The signs in this class were said to share the distinctive characteristic that each is produced with a meaningful handshape representing some entity. In addition, for many classifier predicates, the movement of the hand describes the movement of the entity represented by the hand. Frishberg (1975) describes these handshapes as being "… in particular orientations to stand for certain semantic features of noun arguments" (p. 715). This class of signs came to be called *classifier predicates* (Liddell, 1977) or *verbs of motion and location* (Supalla, 1978). The sign in Fig. 9.1 is an example of the type of sign Frishberg (1975) describes as being produced with a classifier handshape.

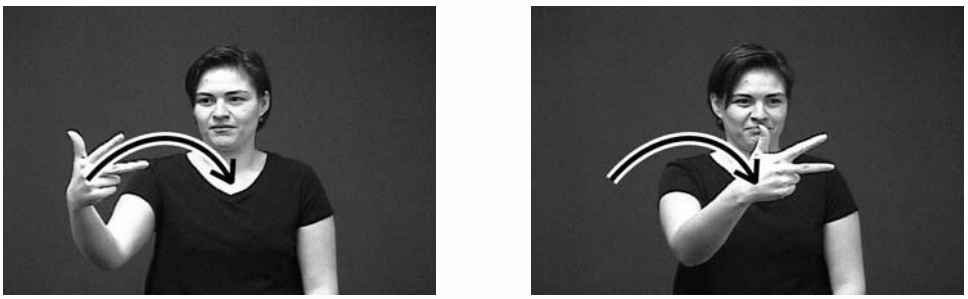


FIG. 9.1. VEHICLE-MOVE-TO.

FIG. 9.2. HAND-PICK-UP-FLAT-THIN-ENTITY.

Most analysts would treat the handshape in this sign as a vehicle classifier. However, Baker and Cokely (1980) describe oriented handshapes, rather than handshapes alone, as carrying the meaning. The sign in Fig. 9.1 could be used to describe the movement of various types of vehicles from a clear starting point *A* to a destination *B*. The vehicle being described could be a car, a bicycle, a boat, or a motorcycle. Thus, the handshape does not signify any specific kind of vehicle, but rather, appears to be used to describe the movement or placement of any member of a class of vehicles, hence the term *classifier*.[2] For the purposes of this chapter, I will use the term *classifier predicate* to label the verbs discussed. I am using this term simply as a convenient label to identify a member of this class of verbs.

Initially, no distinctions were made with respect to the significance of the directionality of classifier predicates and other directional verbs. The first attempt at separating out different functions of directionality was based on how the directional movement of signs is interpreted. The directionality of verbs of motion and location has a gradient, locative significance whereas the directionality of indicating/agreement verbs serves to identify entities corresponding to subjects and objects (Liddell, 1980).

Mandel (1977) uses the term *marker* rather than classifier and includes a description of the significance of location and motion in his definition of markers: "An articulator used in a construct so as to be locatively iconic of an object, so that its behavior and situation in the signing space (whether stationary or moving) represent those of the object" (Mandel, 1977, p. 95).[3] The verb HAND-PICK-UP-FLAT-THIN-ENTITY in Fig. 9.2 is also considered to be a classifier predicate, although it describes the handling of an entity rather than directly representing the entity itself (Boyes-Braem, 1981; McDonald, 1982; Schick, 1980; Supalla, 1982).

The second photo shows the signer gazing at the invisible entity being held. The hand configuration does not represent that entity, but rather, represents the hand holding that entity. In producing this verb the signer is not copying the handshape used in the actual event being described; rather, the handshape in this verb is fixed. This makes it like the handshape in Fig. 9.1, which is also lexically fixed. This handshape is highly iconic because the handshape producing this verb signifies a hand.

In addition to the meaningful aspects of the sign discussed above, the locations and orientations of the hands are meaningfully tied to the locations and orientations of the entities being described.

The verb VEHICLE-BE-AT in Fig. 9.3 represents yet another type of classifier predicate.[4] It is produced with a small downward movement followed by a hold. This sign predicates the presence of a vehicle at a place.

Still another type of classifier predicate describes the size, shape, or extent of entities (Klima & Bellugi, 1979; McDonald, 1982, Supalla, 1982). In Fig. 9.4, for example, the verb,

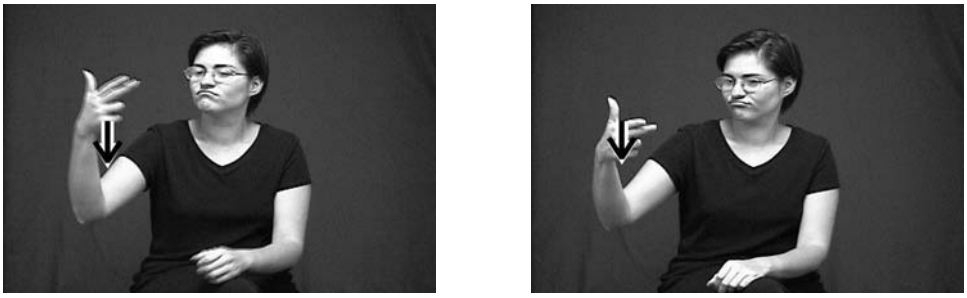


FIG. 9.3. VEHICLE-BE-AT.

FIG. 9.4. BUMPY-BROAD-SURFACE-EXTEND-TO.

BUMPY-BROAD-SURFACE-EXTEND-TO describes a bumpy surface. As in the previous examples, the handshapes are meaningful. Each of the flat B-handshapes represents a broad surface (Supalla, 1982). Through a continuous rotating oscillation of the wrist, the signer produces an undulating movement. In this particular case, the wavy up and down movement of the hand depicts a bumpy surface. The meaningful handshape tells us that the bumpy surface is broad. Signs in which the movement describes a shape are commonly produced with one stationary hand and a moving hand depicting a shape.

There was no attempt to produce a listing of every possible classifier predicate. Instead, ways were sought to provide a productive means of accounting for all possible signs of this type rather than storing each one as a lexical entry. In the late 1970s, two diametrically opposed views of how to do this emerged. DeMatteo (1977) proposes a type of underlying form in which visual imagery rather than morphemes determines the meaning. Supalla (1978, 1982, 1986) provides an alternate model in which classifier predicates are composed entirely of morphemes, and in which visual imagery plays no role whatsoever. Below I examine these two diametrically opposed analyses.

VISUAL IMAGERY AS THE SOURCE OF MEANING

DeMatteo (1977) proposes that visual imagery is significant in ASL. This is especially true in his treatment of classifier predicates. He notes that the types of abstract linguistic representations proposed by linguists as underlying human speech are composed of a limited set of meaningful lexical elements ultimately reducible to morphemes. Sequences of such meaningful elements, structured according to the rules of combination for individual languages, are assumed to under-

lie all spoken utterances. DeMatteo claims that such morphemic representations are not appropriate in the description of classifier predicates.

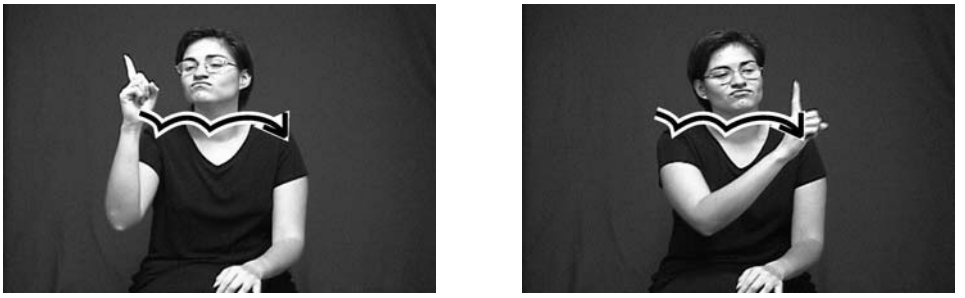
The sign in Fig. 9.5 describes two people at separate locations. The signer's right hand moves in a straight path to the other hand. The intended meaning is, 'Two people were standing, facing one another. One walked over to the other.'

Here is how the imagery analysis works. One first has to imagine that each hand represents a standing person. The palm side of the hand is the front of the person and the tip of the extended finger is the top of the person's head. Simple observation of the placement of the two hands tells an addressee that the two standing people are facing one another. The handshape that moves shows which person moves. The handshape on the signer's right moves to the handshape on the signer's left. This can be understood to mean that the person represented on the signer's right moved to the person represented on the signer's left. Note the similarity of the physical description of the two hands during the production of this sign and the meanings expressed. DeMatteo's claim is that the meanings expressed are understood by watching the visible scene created by the two hands. That is, the classifier predicate in Fig. 9.5 creates, "a spatial analogue of the movement in the real/imaginal world: the function is to enable the addressee in the signed communication to reconstruct the scene in order to infer the relationships between the two actors in the event" (DeMatteo, 1977, p. 115). In this analysis, the signing space serves as a stage within which the two hands represent the two individuals and demonstrate what the two individuals did by recreating their actions in the signing space.

The addressee must view the signing as an analog reconstruction of the actual scene in which the placement and movement of the hands represent the location and movement of the referents. In this analysis, there are no morphemes meaning 'walk' or 'move'. In fact, the concept of a morpheme is irrelevant in understanding the movement of classifier predicates because no morphemic elements underlie the movement of the hands. What does underlie the movement of the hands is a mental image of the actual scene. All the movements that are part of this mental image are transformed to the scale of the signing space and represented by the properly scaled movement of the hands. DeMatteo (1977) proposes that the structure underlying ASL classifier predicates is fundamentally different from the linguistic structures found in all spoken language utterances.

DeMatteo's (1977) analysis appeared at a time when linguists were demonstrating remarkable parallels between signed and spoken language grammars. By doing so, they were amassing evidence that ASL should be treated as a real human language. Given this progress in finding linguistic structure underlying ASL utterances, DeMatteo's proposal did not receive a welcome reception. After all, his claim was that the underlying representation of a classifier predicate cannot be analyzed as one would analyze a spoken language utterance (i.e., as com-

FIG. 9.5. UPRIGHT-PERSON$_1$-WALK-TO-UPRIGHT-PERSON$_2$.



mm
FIG. 9.6. UPRIGHT-PERSON-WALK-ALONG.

binations of morphemes). It would follow, then, that ASL was different in an important way from spoken languages.

DeMatteo's analysis faces difficult semantic problems. For example, in Fig. 9.5, one hand moves along a straight path from its original position to contacting the other hand. The imagery analysis places the burden of figuring out how the person's movement took place on inference. There are many ways of getting from *A* to *B*. One could saunter, shuffle, walk, skip, trot, run, hop on one leg, hop with two legs, and so on. In spite of the large number of possible means of getting from *A* to *B* by foot, the sign means, 'walk from *A* to *B*'.

Now consider the sign in Fig. 9.6. The movement of this one-handed sign is similar to the movement of the moving hand in Fig. 9.5, but with the addition of repeated, up and down movements along the path.

In addition to the up and down movements, the signer is producing the 'mm' nonmanual signal, which adds the meaning, 'unhurried, relaxed, enjoyable, or not out of the ordinary' (Liddell, 1977, 1980). This nonmanual signal provides a source for the "unhurried" aspect of the meaning of this verb. What is the addressee supposed to make of the repeated up and down movements? Given the claim that this is an analog interpretation based on visual imagery, it follows that the person whose movement is being described also made repeated up and down movements. What could cause the person's body to move up and down? Hopping or trotting would certainly make the person's body move up and down along the path. Although either would be a reasonable inference based on visual imagery, both would be wrong. The sign means that the person walked unhurriedly from the original position to the final position. This is a serious problem for the imagery analysis. The *means* of getting from the starting location to the ending location in Figs. 9.5 and 9.6 are not based on inference. That is, signers do not have to figure out whether the person hopped, jumped, skipped, or walked. The person moved by walking. This appears to be a fact about the signs themselves. The claim that imagery and inference can account for the meanings expressed through verbs of motion and location leaves no room for such facts.

MORPHEMES AS THE SOURCE OF MEANING

Supalla (1978, 1982) treats classifier predicates as highly synthetic, multimorphemic predicates. Supalla describes the signs he analyzes as verbs of motion and location. Each such verb consists of one or more movement roots, possible secondary movement and manner affixes, one

or two noun agreement markers, in some cases a body part affix, an orientation affix, affixes marking the orientation and "slantedness" of the "base plane," a placement affix, optional affixes that express the concepts *broken* and *wrecked*, and potentially relational, 'enclosure', and distance affixes. These root and affix categories are summarized in Table 9.1.[5]

We have already looked at the sign in Fig. 9.5 from the perspective of visual imagery. I now describe a morphemic analysis of the same sign. According to my best estimate, this example appears to contain four movement roots. The nonmoving hand stays in place because of a hold root. The active hand begins with a hold root, then a linear movement root, followed by another hold

TABLE 9.1

Possible movement roots and affixes from Supalla (1982)

	Major Categories	*Examples*
Movement roots	stative	linear tracing, arc tracing, circular tracing, hold
	contact	linear stamping, arc stamping, circular stamping, contact
	active	linear path, arc path, circular path, end pivot, mid pivot, spread bend flat, bend round, change diameter
Affixes	secondary movement: degree of change	minimum, maximum
	secondary movement: directionality	unidirectional, contradirectional, bidirectional
	secondary movement: frequency	single, repeated
	secondary manner	hopping, random movement
	size and shape specifier (themselves polymorphemic)	flat and wide, flat and narrow, etc.
	semantic classifiers	vehicle, hull, freely maneuver verticle object
	body classifiers	Components of the signer's body: eyes, nose, mouth, etc.
	orientation of entity	upright, flat side down, edge down
	orientation of base plane	horizontal, vertical, diagonal
	slantedness of base plane	slant toward horizontal axis; slant toward vertical axis
	placement (two such affixes establish a 'base plane')	
	condition	broken; wrecked
	relational morphemes	in, at, at-top, at-side, at-bottom
	'enclosure' morphemes	inside, outside
	distance	unmarked, minimum, and maximum
[needed, but not mentioned in Supalla's analysis]	facing	rightward, leftward, toward signer, etc.

root. The weak hand hold root has at least four affixes. Where possible, I follow the name of a morpheme with a description of its form. If there is no such description, it means that Supalla's analysis does not describe the form of the morpheme. There is a semantic classifier affix signifying a freely maneuverable vertical object, represented by a 1-handshape. There is an uprightness affix expressing the meaning that the entity is in its "normal" upright position. For this classifier, uprightness is signaled by orienting the base of the hand downward.[6] There would also be a placement affix (undescribed form), and an affix signifying the direction the upright object is facing (undescribed form). There is no sequentiality involved with this root and affixes. They all combine simultaneously to form a single, nonsequential unit.

The other hand articulates several other morphemes. It begins with a hold root like the weak hand, but with some of the affixes being different. Although the semantic classifier and the uprightness affixes are the same as those on the weak hand, it begins with different place and orientation affixes (both undescribed). That is, the hand is located at a different part of the signing space and the palm is facing in a different direction. Supalla (1982) also notes that two placement affixes determine a base plane. Because the movement roots associated with each hand have placement affixes, there are two such placement affixes. Presumably, we now need to add a horizontal morpheme for the base plane (undescribed form). In addition, we need an affix marking the distance between the two entities. For our purposes, we use the unmarked distance affix (undescribed form). These last two affixes, horizontal base plane and distance between entities, would have to attach to one of the roots—but which one? The horizontal base plane would seem to be a characteristic of the entire combination, as would the distance between the two entities. There is no obvious root for the attachment of these two morphemes.

Thus, prior to the movement of the active hand, we have two movement roots and a large number of affixes. If the two morphemes ('horizontal base plane' and 'unmarked distance') are attached to only one of the roots, then there is a total of 12 morphemes prior to the movement of the hand (shown in boldface in Table 9.2). The moving hand will require an additional linear path root (straight movement), followed by a hold root. The path root will require a unidirectional affix and a single instance affix. A full description also requires a final minimum distance affix (undescribed form), signifying that the two entities are now a minimum distance apart.

For each root I attempted to estimate both the maximum and minimum number of morphemes needed in this analysis. In computing the maximum, I assume that each movement root has its own set of affixes. In computing the minimum, I counted identical repeated affixes as a single affix. Morphemes that are part of the minimum count appear in boldface in Table 9.2. The repeated morphemes are written in italic. Thus, in this morphemic analysis, the single sign in Fig. 9.5a is composed of 4 movement roots and a minimum of 14 affixes. If each root requires its own full set of affixes, then the total is much larger: 4 roots and 24 affixes.

In this analysis, the meaning expressed by this sign is fully and exclusively morphemic. That is, the meaning is derived from the meanings of the 18 or 28 morphemes described above: A nonmoving, freely moveable vertical object is upright on a horizontal surface facing in some direction, while another nonmoving freely moveable vertical object is upright on a horizontal surface facing in another direction. One object then makes a single unidirectional movement in a path toward the other resulting in a minimal distance between the two.

So far, the morphemes give no indication as to whether the two entities began facing one another. The morphemic representation only tells us that there are two entities facing in different directions. In order to account for the meaning, we might add a 'facing one another' affix to make the relationship clear. This would bring the total to four roots and either 15 or 25 affixes.

TABLE 9.2

The morphemes in PERSON$_1$-WALK-TO-PERSON$_2$

	Weak hand	*Strong hand*		
	hold root	**hold root**	**linear movement root**	**hold root**
secondary manner				
semantic classifiers	**freely moving vertical entity**	**freely moving vertical entity**	*freely moving vertical entity*	*freely moving vertical entity*
orientation of entity	**upright**	**upright**	*upright*	*upright*
facing	**rightward**	**leftward**	*leftward*	*leftward*
orientation of base plane	**horizontal**	*horizontal*	*horizontal*	*horizontal*
placement (two such affixes establish a 'base plane')	**(placement$_a$)**	**(placement$_b$)**	*(placement$_{b-c}$)*	**(placement$_c$)**
distance		**(unmarked distance)**		**(minimum distance)**
directionality			**unidirectional**	
repetition			**single instance**	
max # of morphemes; 4 roots + 24	**Root + 5**	**Root + 6**	**Root + 7**	**Root + 6**
min # of morphemes: 4 roots + 14	**Root + 5**	**Root + 5**	**Root + 2**	**Root + 2**

This number of roots and affixes is needed because visual imagery is eliminated as a source of meaning. That is, if one looks at the two hands as entities with fronts and backs, and assumes that the palms represent the fronts of the entities, one can see that the two hands are facing one another. This source of meaning is not available in the morphemic analysis. Instead, there is an apparent need for a morphemic means of expressing that the two standing people represented in Fig. 9.5 were facing one another. I suggested that a 'facing one another' affix might be needed. However, saying that such a morpheme might be needed does not solve the problem. All I have really suggested is that because the signing expresses that the two people are facing one another, and because all meaning is assumed to come from morphemes, there must be a 'facing one another' morpheme. One possible solution would be to say that the orientation with the two palms facing one another could be the form of the morpheme. This might help with two upright entities, but what about one upright entity and one vehicle? A person could face the front of the vehicle, either side, the rear, or something in between. Two palms facing one another will not work as a general solution to the facing problem.

The guiding assumption of the morphemic analysis of classifier predicates is that all meaning is represented by means of morphemes. Once this assumption is made, there appears to be no choice other than to begin positing morphemes for all the meanings found in the sign. Supalla (1982) is explicit about this guiding assumption:

> But ASL, being in the important senses an instance of a humanly possible language, has universal design features in common with all human languages. Most importantly: Human linguistic systems are digital, not analogue, a fact independent of the peripheral resources (mouth and ear, or hand and eye) that are used to create the forms. (p. 9)

Given the working assumptions of this analysis, the fact that locations are distinctive leaves no choice but to treat locations as morphemes. In Fig. 9.5, for example, each hand is placed at a morphemic location. But how many such location morphemes are there and what do they mean? In an apparent answer to this question, Supalla (1982) proposes a "base grid" system. In this system, there are limited numbers of base points which together, constitute a base grid. Fig. 9.7 illustrates six possible meanings, depending on the relationship between the movement path and the base grid.

Using the six locations in Fig. 9.7, the signer is able to express the six meanings shown. One can represent movement from, movement through, movement to, movement from beside, movement past, and movement to beside. The relationship between the movement path and the base locations determines which of these meanings is expressed. Although the total number of possible relationships between base points proposed by Supalla (1982) is very limited, this proposed restriction on relationships between base points does not address the placement of the base points themselves. Apparently, base points can be located in any of innumerable places in the signing space.

Contrary to the notion of a discrete number of locations in a base grid, it appears that signers are free to select points in the signing space guided by the actual physical relationships they are trying to depict, without having to match individual locations to a discrete number of predetermined number of spatial loci. Poizner, Klima, and Bellugi (1987) remark on the amount of detail that can be included in this type of description.

> We first saw this mapping aspect of signing in its full form when a visiting deaf friend was telling us about his recent move to new quarters. For five minutes or so, he described the garden cottage in which he now lived - rooms, layout, furniture, windows, landscaping, and so forth. He described it in exquisite detail, with such explicit signing that we felt he had sculpted the entire cottage, garden, hills, trees, and all in front of us. (p. 206)

This type of intricate, detailed topographical description makes use of the three-dimensional space ahead of the signer and can in fact give the impression of the sculpting of space. It is hard to imagine that such descriptions would be possible if only a limited number of spatial loci were available for use in that description.

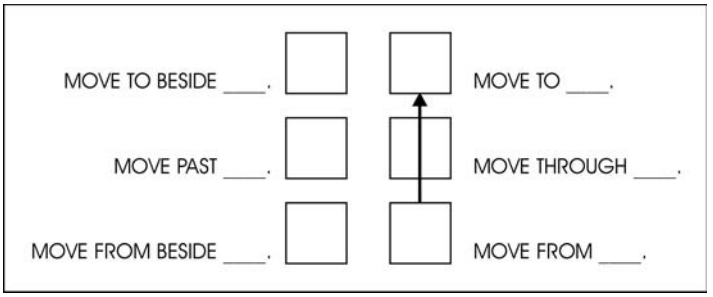


FIG. 9.7. The base grid system (Supalla, 1982).

Poizner et al. (1987) also evaluated the ability of signers with brain damage to produce spatial descriptions and found that signers with right brain lesions showed impaired ability to produce such descriptions. Their description of one patient, Sarah M., is particularly interesting. She was asked to draw her bedroom from memory and also to describe it in sign. They state that her description and her drawing "matched," although with respect to some details, the sign description was incorrect. For example, a large white dresser was "displaced to the far wall, more toward the right" (Poizner et al., 1987, p.208). In an English description of a room, we might say, "The dresser was adjacent to the right wall." If the dresser was really adjacent to the left wall, then the description could be described as deviant and the source of that deviance could be attributed to the incorrect choice of the lexical item *right* rather than the correct choice, *left*. Making decisions about the deviance of the signed description would not be based on having selected the wrong location morphemes, but on a comparison of the placement of the figures in the drawing with the physical placement of the classifier handshapes in the signing space. This strongly suggests that, with respect to location, we are dealing with a spatial, perceptual issue rather than a morphemic one.

Supalla (1982) argues that the underlying representations of ASL classifier predicates are composed solely of morphemes. Supalla's morphemic proposal depends on the existence of a finite number of morphemes that can be selected and combined in myriad ways to produce all possible classifier predicates. This search for listable morphemes proceeds in a satisfactory way when we restrict our attention to meaningful handshapes. If we attempt to list spatial loci, loci on the body, and some orientation features, we run into what appear to be insurmountable problems. Supalla's (1982) analysis depends on the existence of such finite lists of morphemes but no one has yet proposed any such lists.

Supalla (1978, 1982) proposes that individual classifier predicates are constructed from a highly productive system in which any of a large number of affixes attach to one or more movement roots to produce an unlimited number of possible classifier predicates. DeMatteo (1977) proposes that markers simply move around in space in an analogical way, much as one would move dolls to show the interaction among people. Below I examine additional problems faced by both approaches.

UNACCEPTABLE FORMS

Much of the data discussed below comes from an ongoing classifier analysis project related to the meanings and forms of fully acceptable classifier predicates. An important aspect of this project involves an attempt to identify unacceptable classifier predicates.[7] The ability to identify unacceptable classifier predicates is crucial to understanding the nature of the signs being examined. At this stage of the project, the focus is still on collecting fully acceptable signs, while, at the same time, paying close attention to potential gaps—signs we do not see, but that are predicted to be possible. The four ASL consultants assisting in this project are Deaf and grew up in families with Deaf parents. They attended residential schools in different parts of the country and all are currently students at Gallaudet University in Washington, DC.

Some unacceptable signs are described in Supalla (1990), where the existence of serial verbs is attributed to nonexistent signs. Supalla observes that signs expressing manner of locomotion such as running, limping, or pushing off with one leg while coasting on a wagon, do not simultaneously show movement along a path. Supalla (1990) attributes this to a selectional restriction that disallows combining body classifiers with "morphemes for path of motion, direction of motion, or

manner of motion along the path" (p. 144). Thus, in order to express 'limping in a circle', one must first produce a sign describing the type of locomotion, then another verb describing the path.

The systems proposed by both Supalla (1990) and DeMatteo (1977) predict large numbers of other signs that we do not see. For example, Fig. 9.8 illustrates four ways of expressing that a person walked from one place to another. In Fig. 9.8a, an upright 1-handshape moves in a straight path. In Fig. 9.8b, the same upright handshape moves along the same path but with a superimposed up and down bouncing movement.

The sign in Fig. 9.8b also differs from the sign in Fig. 9.8a in the accompanying nonmanual signal. In Supalla's (1982) analysis, the up and down movement is a secondary movement affix encoding something about the manner of the movement. It doesn't appear to encode a bouncing manner, because that would imply hopping or jumping. Instead, it appears to encode a meaning more related to an unhurried manner of movement.

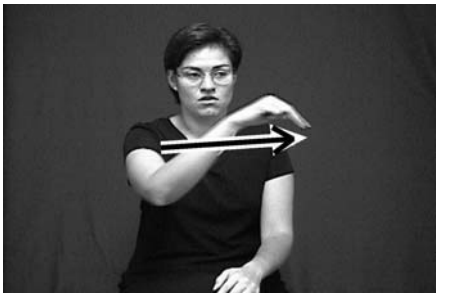
In Fig.9.8c, a V-handshape with the fingers oriented downward moves along a path while the fingers wiggle. If we assume that the bouncing movement is an affix, then it ought to be possible to attach that affix to the sign in Fig. 9.8c, producing the sign in Fig. 9.8d. The resulting sign, however, is unacceptable. Similarly, adding this proposed affix onto a sign depicting the movement of a vehicle ought to produce the meaning, 'drive in an unhurried manner', but this is also unacceptable. Adding this proposed affix onto a sign depicting the movement of an animal also produces an unacceptable result. We see later that the same up and down movement only occurs in two other signs that express a casual manner of movement. An analysis maintaining that the up and down movement is an affix would have to say that the affix is limited to roughly three words in the language.

A comparison of the sign in Figs. 9.8a and 9.8b reveals additional restrictions. The sign in 9.8a is used easily and naturally with the addition of a second hand. That is, suppose that a second person is represented by another 'upright person' handshape. The straight movement of the sign in Fig. 9.8a can easily be directed toward the second handshape to mean that one person walked over to the other. Although the sign in Fig. 9.8b is typically regarded as a variant of the sign in 8a, native signers consultants show a strong preference for using the straight path motion in Figure 8a rather than the bouncing form in Fig. 9.8b to describe the movement of one person to another.[8]

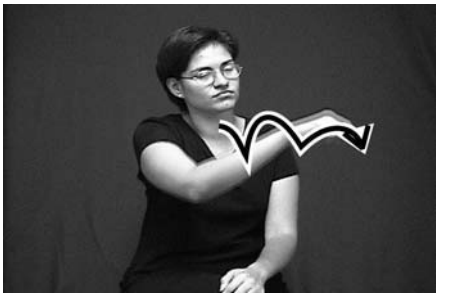
There are additional restrictions on combinations of path movement and handshapes. When the 'upright person' handshape moves along a straight path, it expresses the meaning, 'walk along the path'. Similarly, BIPED-WALK-TO encodes the meaning 'walk along a path'. With 'vehicle', the meaning is, 'drive along a path'. With the 'animal' handshape, the meaning should be 'walk/move along a path', but this form does not exist. Similarly, the 'upright person' classifier moves along a straight path to just ahead of the signer's face to mean, 'person walked to me'. Signers consulted for this project do not use the form with the bouncing movement meaning, 'person walked to me in an unhurried manner'. Additionally, the form with the 'biped' handshape is not used to mean, 'person walked up to me'. This could be blamed on the awkwardness of orienting the knuckles of the downward pointing fingers toward the face. But preliminary data suggests that signers also do not use this handshape to show one person walking to another person. There are other interesting restrictions connected with these three signs. The 'upright person' handshape, when a second handshape was not present, was not used to express movement either up or down a hill. To describe a person walking down a hill, signers preferred to use the 'biped' classifier rather than the 'upright person' classifier. Also, if a spacecraft were capable of pulling a person from the earth up into the spacecraft, the upward movement of the person was represented with the 'biped classifier', but not the 'upright person' classifier.

a. UPRIGHT-PERSON-WALK-TO.

b. UPRIGHT-PERSON-WALK-ALONG.



c. BIPED-WALK-TO.



d. BIPED-WALK-ALONG (non-existent sign).

FIG. 9.8. Three actual signs and one non-existent sign.

FIG. 9.9. FIVE-PEOPLE-BE-AT.

The verb, FIVE-PEOPLE-BE-AT in Fig. 9.9 expresses the meaning that five standing people were located in a certain place. It is produced with a 5-handshape with the thumb and fingers extended and straight. It is produced with a short downward movement followed by a hold.

This verb was acceptable following the subject, FIVE PEOPLE. Thus, the 5-handshape is acceptable in that verb. In contrast, most of the informants would not use this handshape in signs expressing the movement of five people. However, there is a sign expressing the movement of several people to another person. This sign is produced with a nonmoving, vertical 1-handshape and a 5-handshape with the thumb and fingers slightly bent. The "bent 5" hand moves toward the 1-handshape in a straight line. There is no equivalent sign with a superimposed bouncing movement. There is also no equivalent one-handed sign. That is, the nonmoving 1-handshape appears to be a required part of this sign.

It is possible to use a classifier predicate to show a car crashing into a tree. In doing so, when the tip of the 3-handshape contacts the forearm, the fingers bend into a hooked configuration so that the flat surfaces of the hooked fingers are in contact with the forearm. Supalla (1982) analyzes this as resulting from the addition of a 'broken/wrecked' affix, realized as the change in handshape. Interestingly, there is no comparable form, WRECKED-VEHICLE-BE-AT, produced with a short downward movement followed by a hold. That is, although VEHICLE-BE-AT is fine, there is no comparable verb, WRECKED-VEHICLE-BE-AT.

If classifier predicates simply created an analogical scene as proposed by DeMatteo (1977), or freely combined an orientation morpheme with a path morpheme, as proposed by Supalla (1982), then it ought to be possible to describe a person walking backward by moving the 1-handshape with the back of the hand toward the goal. This potential sign is not acceptable.

The next example is taken from a narrative in which a signer describes a door that is capable of being latched by attaching a security chain from the wall to a metal slot attached to the door. The signer was describing the fact that the chain was not attached. She produced a sign in which the index finger was oriented downward and swinging back and forth. The signer, however, was describing a situation in which a chain is hanging straight down because it was not attached to the door. If this sign simply expressed the result of putting morphemes together to create a polysynthetic predicate, the side to side swinging movement should be expressing the swinging movement of the chain. The fact that this sign was used to describe a stationary chain suggests that it is a lexical form. This does not mean that the sign has no internal structure. It also does not imply that metaphor is playing no role. It simply suggests that the meaning one would expect from the swinging form does not correspond in a straightforward way to the stationary object being described.

Restrictions, gaps, and idiosyncrasies like those described above are common. Neither the "visual grammar" approach nor the "polysynthetic" approach provides an account for such restrictions.

CLASSIFIER PREDICATES AS LEXICAL ITEMS

I have argued extensively that the spatial entities toward which indicating verbs are directed are mental space entities (Liddell, 1995, 1998).[9] I do not repeat those arguments here and proceed with the assumption that such spatial entities are not morphemic, can be placed analogically, and that the resulting spatial constructs appear to be gradient. I take it as given that the placement of the hands in producing classifier predicates must also be seen as part of this analogical and gradient structure. In addition, some aspects of the orientation of the hands must also be treated as analogical.[10] That is, while the 'upright person' handshape is oriented vertically with respect to a horizontal surface, the direction the palm faces is variable. Similarly, the 'vehicle' classifier is oriented with the ulnar side of the hand down, while the direction of the fingertips is variable. It would be very difficult to argue that such variable elements were part of the lexical representation of these verbs. I remove location and some aspects of orientation from consideration and assume that what remains encodes the meaning of the verb. In order to be produced, these verbs need location specifications and many need orientation specifications.

I now examine in detail the verb UPRIGHT-PERSON-WALK-ALONG, produced with a vertical 1-handshape and a bouncing movement as it moves along a path (Fig. 9.8b). Removing the variable, gradient elements, is the first step in coming to a description of the verb. In this verb, those elements are the initial and final locations of the hand and the orientation of the hand toward the final location. Once these are removed, what is left is less than a full sign because it has no features locating the hand or orienting the palm. It consists of a 1-handshape, a straight path movement with a repeated bouncing movement from the initial location to the final location, and features orienting the base of the hand downward. This combination of features encodes the meaning, 'person walks along in an unhurried manner'. Identifying this unit constitutes the first step in the analysis of this sign. When this meaningful unit is combined with the specific path and orientation seen in Fig. 9.8b, the result is called a *classifier predicate* or *verb of motion and location*.

Applying the same analytical approach to the sign in Fig. 9.8a, where the hand does not bounce, will produce a different set of features and a different meaning. In Fig. 9.10, I represent each of these verbs with an English gloss and attempt to describe the meaning associated with each.

Specific instances of UPRIGHT-PERSON-WALK-TO (Fig. 9.10a) seem to express purposeful movement toward a goal. Specific instances of UPRIGHT-PERSON-WALK-ALONG are not as centrally goal oriented, seeming to put more emphasis on the manner of walking than on the goal. It is interesting to observe that UPRIGHT-PERSON-WALK-TO can be directed toward the signer's face to mean, 'person walk to me'. The signers in this study did not favor using UPRIGHT-PERSON-WALK-ALONG directed toward the signer's face. This is also consistent with the proposal that UPRIGHT-PERSON-WALK-TO is more goal oriented than UPRIGHT-PERSON-WALK-ALONG.

Recall that the 'animal' handshape is not used on a straight path to express the walking movement of an animal. Similarly, the 'five upright people' handshape is not used to express the walking movement of five people, although it can be used to express that five people are located in a specific place. I am proposing that the unacceptability of the verbs ANIMAL-WALK-ALONG or ANIMAL-WALK-TO (with a single, hooked V-handshape) is that they are not currently part of the lexical inventory of ASL verbs. Such signs might very well exist in someone's idiolect or might one day be widespread. Although either is possible, available data makes it look like these hypothetical verbs are not widely shared across the community of ASL signers.

Form	1-handshape oriented base down moves along a straight path.
Meaning	'person walks (normal forward orientation) to a place'.

a. UPRIGHT-PERSON-WALK-TO

Form	1-handshape oriented base down moves along a straight path while the hand slowly "bobs" up and down.
Meaning	'person walks along (in an unhurried manner and in a normal forward orientation)'.

b. UPRIGHT-PERSON-WALK-ALONG

FIG. 9.10. A comparison of two similar signs.

This is equivalent to noting that although the word *seniority* currently exists as a word of English, the potential English word *juniority* does not. It is a potential word, but is not currently an English lexical item.

The various 'be at' verbs are additional examples of lexical units. The verb meaning, 'a standing person is there', is typical. It is produced with a 1-handshape with the base of the hand oriented downward. The sign consists of a short downward movement of the hand followed by a hold. Neither the movement nor the hold is independently meaningful. The two movements, in combination with the 1-handshape oriented vertically expresses the existence of a standing person at a location. The specific location is depicted when the hand moves downward to an analogical, gradient location. I am proposing that there are a large number of such 'be at' verbs, showing the presence of entities at locations. For example, there is a verb showing the presence of an airplane at a location. Although signers generally use a "baby" C-handshape to show the movement of a saucer shaped UFO, most of the signers I asked are reluctant to produce a 'be at' verb with this handshape. This is explained in the proposal I make here by the observation that the particular 'be at' verb is not a widespread, established lexical unit of ASL. There are many other such examples. For example, although there is a 'be at' verb expressing the presence of an 'upright' car at a location, there is no corresponding 'be at' verb expressing an upside down vehicle (e.g., a car or bicycle) at a location. The lack of 'be at' verbs is more the rule than the exception for instrumental or 'handling' handshapes.

ANALYZABILITY AND PRODUCTIVITY

The claim that classifier predicates are lexical items is independent of the nature of their internal structure. The nouns *bird* and *foolishness* are both English lexical items. The former has no morphological internal structure whereas the latter contains three identifiable morphemes. Both are lexical items of English. So far my arguments focused on the lexical status of classifier predicates. Here I take up the issue of possible morphological internal structure.

If classifier predicates are ASL lexical items, there must be an enormous number of them. Although all of them make productive use of space, the question I wish to address here is not about space. The question here is the degree to which such verbs are morphologically analyzable, have compositional meanings, and constitute a productive morphological system.

Although I have been using the term *classifier predicate* and focusing on verbs with meaningful handshapes, this analysis does not necessarily draw a categorical distinction between verbs with handshapes corresponding to entities and similar verbs where the ability to associate handshapes with entities is less clear. For example, the sign, DRIP-AT (Fig. 9.11a), is also placed in space in the same way and signifies an action taking place at a location. It is produced by releasing the index finger being held back by the thumb and extending the index finger downward. The wrist also contracts, giving an additional downward component to the movement of the tip of the index finger.

Instances of DRIP-AT also involve placing the hand at an analogical location. The downward orientation of the hand is fixed and the sideward facing of the hand is not significant. It is produced with the release of the index finger seen in UNDERSTAND (Fig. 9.11b). It would be difficult to make a claim that the two handshapes of DRIP-AT are classifier handshapes. The extended index finger does not represent a drop of liquid. The drop of liquid is understood to have proceeded downward in the direction of the extended index finger. As a result, this particular sign appears to be virtually unanalyzable from a morphemic perspective. This is not to say that this sequence of handshapes may not be motivated. The straightening of the index finger along with the contraction of the wrist make the fingertip move along a path. The sign, TATTLE, contains the same handshape sequence and can be viewed as metaphorically expressing the movement of information from one person to another. At issue here is whether the

a. DRIP-AT

b. UNDERSTAND

FIG. 9.11. Two signs made with the same release of the index finger.

handshape sequence should be viewed as a morpheme. For example, the consonant sequence [rl] occurs in the English words like *curl*, *swirl*, *whirl*, *twirl*, *furl*, and *gnarl*. Because these words all have meanings related to round, twisted shapes, the sequence [rl] comes to suggest these meanings. Linguists do not analyze [rl] as a morpheme in these words because the remainder of each of the words has no identifiable meaning. As a result, we are left with the observation that the sequence [rl] is suggestive of twisting and turning shapes.[11] As a result, it is not the meaningfulness of the handshape sequence that is at issue, but the best way to analyze that handshape sequence. Regardless of the ultimate analysis of the two handshapes in DRIP-AT, the verb nevertheless acts like a classifier predicate in that producing it involves placing the hand at an analogical spatial location.

Most of the verbs described in this chapter are produced with meaningful handshapes. In addition, each meaningful handshape tends to occur in more than one verb. For example, I have already discussed a number of verbs produced with a 1-handshape, representing a person standing or walking. One such verb, UPRIGHT-PERSON-BE-AT, appears to be fully analyzable into two morphemes. It is produced with a vertically oriented 1-handshape that occurs in many other signs also expressing the meaning, 'person standing or walking'.[12] The downward movement followed by a hold constitutes the remainder of the lexical verb. This verb root predicates the presence of an entity at a place and the upright person morpheme identifies the type of entity predicated as existing at that place.[13] The combination of a meaningful verb root and a combination of features representing a standing human together appear to constitute the lexical verb, UPRIGHT-PERSON-BE-AT. As with all classifier predicates, any instance of this verb will require placing the hand at an analogical location, facing in an analogical direction.

Verbs like UPRIGHT-PERSON-BE-AT or VEHICLE-BE-AT appear to be fully analyzable. Is this pattern so strong that one can freely construct new verbs of this type? The answer is *no*. I already described the unacceptability of the nonexistent sign, WRECKED-VEHICLE-BE-AT, and UPSIDE-DOWN-VEHICLE-BE-AT. The nonexistence of these forms suggests that although the number of existing signs is very extensive, it is not necessarily highly productive because one cannot freely produce new forms. This does not mean that it would be impossible to coin a new form. Just as the potential English word *juniority* may someday become a real word of English, WRECKED-VEHICLE-BE-AT or FLYING-SAUCER-BE-AT may also someday become widespread in ASL. But it is clear that one cannot simply "put pieces together" and have an acceptable sign.

The verb UPRIGHT-PERSON-WALK-ALONG, appears to be less fully analyzable. Because it does have the 1-handshape oriented upward expressing the meaning 'upright person', that form-meaning unit is an identifiable part of the verb. A comparison of the forms of UPRIGHT-PERSON-WALK-ALONG and UPRIGHT-PERSON-WALK-TO shows a significant movement difference. UPRIGHT-PERSON-WALK-ALONG has a slow bouncing movement as the hand moves along its path and also is produced with the nonmanual signal 'mm', signifying relaxation and enjoyment. The two signs also differ in their focus on arriving at a goal. What meaning can be associated with the bouncing movement? Could it be responsible for both the lack of focus on a final destination as well as something about the manner of walking? If there were other signs that could be produced with this slow bounce, it might help lead to an answer to this question. Apparently, the only other signs with this movement appear to be TWO-UPRIGHT-PERSON-WALK-ALONG and THREE-UPRIGHT-PERSON-WALK-ALONG.[14] This slow bouncing movement clearly does not exist with the 'vehicle' handshape or the 'animal' handshape to express unhurried movement without focus on an eventual goal. This

limited data makes it difficult to support the bouncing movement as morphemic. The most one could say is that, if it is morphemic, it is highly restricted. It only appears in (apparently) the signs, UPRIGHT-PERSON-WALK-ALONG, TWO-UPRIGHT-PERSON-WALK-ALONG, and THREE-UPRIGHT-PERSON-WALK-ALONG.

The various patterns presented in this enormous number of classifier predicates could potentially lead to the production of new verbs. For example, I showed a signer a drawing of an automobile whose back tires had become legs. With those two legs, the car was able to walk upright. When asked how to describe the walking vehicle, the signer first explained that the tires had become legs, then produced the novel classifier form shown in Fig. 9.12. It looks like the verb BIPED-WALK-TO, but with the addition of the 'vehicle' handshape on top of the 'biped' handshape.

The two handshapes together represent this hybrid entity. This nonce form was created on the spur of the moment and is not an established lexical form in ASL. It was possible to build it, however, because a number of existing verbs expressing movement along a path exist and can serve as the basis for a schema for movement along a path. The schema involves the movement of a handshape oriented in a particular way from one place to another. The primary difference between the various forms is in the handshape that appears as part of the verb and the way the handshape is oriented. In order to create a new verb, a new handshape and orientation combination signifying a particular type of entity is needed.

The signer chose the put two handshapes together to represent the entity. The 'biped' handshape was used in its normal orientation. The 'vehicle' handshape, however, was not. Instead, the base of the hand faced down with the fingertips facing up. Note that this is a novel combination of handshapes that does not represent two distinct entities. Thus, this is not a straightforward productive addition of a handshape morpheme to an existing verb. The biped part of the combination does not represent a human and the vehicle part does not represent a complete vehicle.

The point of this example is that it is possible for new forms to come into existence based on the patterns (schemas) observable across the set of classifier predicates. If automobiles walking upright were a common sight, I would expect that this sign (or something like it) would come to be an established ASL verb.

There is additional anecdotal evidence supporting the lexical treatment of classifier predicates being proposed here. It has to do with the issue of specialized vocabulary. It is well known that a technical vocabulary develops around specialized activities. Over the past 25 years, I have frequently asked native signers to describe things. Several times over the years I have been told,

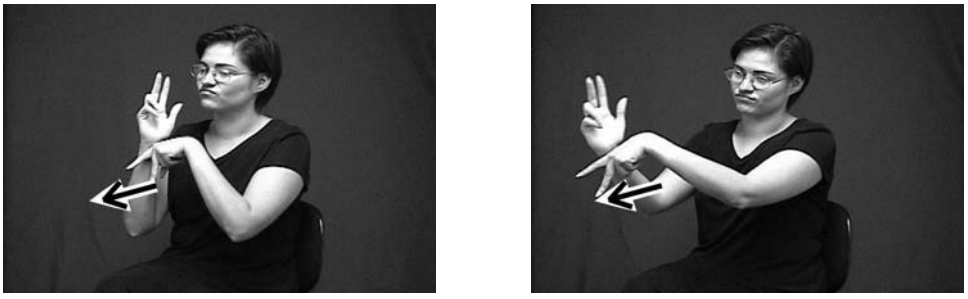


FIG. 9.12. BIPED-VEHICLE-WALK-TO.

"I can't tell you about *X* because I don't do *X*." For example, a female signer explained that she could not describe what happens on the football field because she does not play football. This response was puzzling for many years. I now see this as an issue of technical vocabulary. Football players develop the technical vocabulary needed to talk about football. Because much of football involves motion, positions, and action, it would be normal for much of that vocabulary to involve classifier predicates. As football players, they learn that vocabulary. A native signer that was not involved in football would not know that vocabulary—classifier based or otherwise.

Classifier predicates vary in terms of analyzability, compositionality, and productivity. Once placement and some aspects of orientation are removed from consideration, some of these signs are almost completely analyzable whereas others are virtually unanalyzable. I suggest that it does not make sense right now to discuss the issue of productivity for classifier predicates as a class. Issues of productivity will have to await identification of patterns within specific subclasses. Some of these may be more productive than others.

BLENDED SPACES

The verbs I have described in this chapter share one final characteristic. The signer always places them within a spatial conceptualization "projected" into the space ahead of the signer. These projections create grounded, blended mental spaces (Liddell 1995, 1998, 2000, Liddell and Metzger 1998). Liddell (in press) examines many verbs of this type.[15] In one example, a signer describes a cat on a fence. She does this using a placed instance of the noun FENCE, followed by the clause CAT ANIMAL-BE-AT. She produces the noun FENCE along a diagonal vector in the space ahead of her. In order to properly direct her hands she has to conceptualize the space ahead of her as a topographical space containing the fence. This involves blending aspects of the scene being described with the space ahead of her.[16] In producing ANIMAL-BE- AT, she moves her weak hand to the location where the cat would be depicted on the fence and produces ANIMAL-BE-AT such that it makes contact with the radial surface of the index finger of the weak hand as shown in Fig. 9.13.

I use vertical brackets to identify elements of the blended space. Thus, the label |fence| identifies the fence conceptualized in the space ahead of the signer. The area surrounding the |fence| is the |surface| upon which the |fence| rests. The space in the scene being described is mapped onto the space near the |fence|. Space further from the fence being described is mapped onto the space further from the |fence|. During ANIMAL-BE-AT, both hands actually become part of the spatial representation depicting the cat on the fence. The signer places her weak hand such that, through blending, it becomes a part of the |fence|. The subject CAT identifies the animal de-

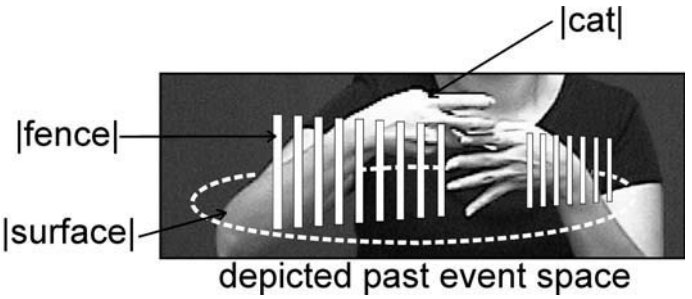


FIG. 9.13. Depicting a cat on a fence in the space ahead of the signer.

scribed by the verb as a cat. In addition, the handshape producing ANIMAL-BE-AT blends with the cat being discussed to become the |cat| in the depiction ahead of the signer.

The verb signifies that an animal is located at a place. This information is encoded as part of its lexical semantics. The physical relationship between the cat and the fence, however, is shown by the physical placement of the two hands. The location of the hand producing ANIMAL-BE-AT depicts the location of the animal in the blended space. By placing the hand on top of the hand blended with the |fence|, the signer depicts the |cat| on the |fence|.

The result is quite unusual. The three signs in the grammatical construction above express grammatically determined meanings just like words in grammatical constructions in any language. In addition, the hands producing these signs also depict certain aspects of what is being described. In Fig. 9.13, one hand depicts a cat, the other depicts a part of a fence, and the physical relationship between the two hands depicts the physical relationship between the cat and the fence.

CONCLUSION

I am proposing that the classifier predicates analyzed in this paper are fixed lexical verbs. These verbs become full signs by placing and directing them in analogical, gradient ways. This will always include placing the hand at an analogical location, and will sometimes include directing the hand's orientation analogically. This description is meant to apply equally to a 'locative' verb such as DRIP-AT and a 'classifier predicate' such as VEHICLE-DRIVE-BY. I am suggesting that this should be the starting point for a morpholocial analysis.

These verbs vary in their analyzability. In general, meaningful handshapes can be identified. Once we get beyond handshapes, however, finding morphemic parts is not so straightforward—and goes beyond noting that a certain meaning is being expressed. Based on the data I have looked at, classifier predicates do not appear to be polysynthetic. It is probably too early to speak with any confidence about productivity within this system. Before talking about productivity it will first be necessary to identify the units that are supposed to contribute to that productivity. This identification will need to be based not only on meanings expressed, but identifiable parts of signs that express that meaning.

ENDNOTES

[1]Much of the material in this chapter can be found in Liddell (in press, chap. 9). The arguments there focus on mental space blending and meaning construction.

[2]What constitutes the class of vehicles is a language specific issue. In ASL, this handshape is used to represent the movement and placement of vehicles such as cars, bicycles, motorcycles, and trucks, but not airplanes, rockets, etc.

[3]In the 1970s, researchers at the University of California at Berkeley used the term markers rather than classifiers. This terminology appears, for example, in Mandel (1977), DeMatteo (1977), and Friedman (1975, 1977); the terminology was not widely adopted by others.

[4]Supalla (1978) describes verbs such as this one as being constructed from a "contact root."

[5]McDonald (1982) and Schick (1990) propose alternate views of the structure of these signs. I do not consider these proposals in depth here because my major aim is to contrast two diametrically opposed views on the structure of classifier predicates. The proposals by McDonald and Schick are also based on the idea that classifier predicates are highly synthetic morpheme combinations.

[6]The form of the morpheme would vary according to the individual classifier. A vehicle classifier is "upright" if the ulnar side of the hand is oriented downward.

[7]My thanks go to Melissa Draganac and Kristin Mulrooney, who have been gathering data from four ASL consultants. I would also like to thank MJ Bienvenu for insightful discussions about classifier predicates and for providing additional examples.

[8]I am purposely avoiding the use of terms like *ungrammatical* for reasons that become apparent later.

[9]Even among supporters of an agreement analysis of verbs such as GIVE, the spatial locus assigned to a physically present referent is agreed to be in the direction of that referent. Because a referent can be located in innumerable directions with respect to the signer, there is no limit on the number of such locations.

[10]I argue for the analogical treatment of location and some aspects of orientation with respect to indicating verbs in Liddell (1995).

[11]This type of sound symbolism is called *phonesthesia*.

[12]Baker and Cokely (1980) describe classifiers as handshapes. However, they often cite specific instances of classifiers as combinations of handshape and orientation features.

[13]The downward movement followed by a hold is what Supalla (1978, 1982) identified as a "contact root."

[14]The informants consulted for this research do not use the 4- or 5-handshapes with this bouncing movement.

[15]Chapters 5 through 10 in Liddell (in press) provide extensive discussion of the roles of mental spaces and mental space blending in meaning construction in ASL. Chapter 9 includes an expanded discussion of the verbs being described here.

[16] The conceptual process called mental space blending is described in Fauconnier and Turner (1994, 1996), Turner and Fauconnier (1996), and Fauconnier (1997). Liddell (in press) provides an extensive treatment of mental space blending in ASL discourse.

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10

Categorical Versus Gradient Properties of Classifier Constructions in ASL

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Classifier constructions in American Sign Language (ASL) were originally described as a type of mimetic depiction (Klima & Bellugi, 1979), rather than as morphologically complex signs. However, Supalla (1978, 1982) argued that classifier verbs were composed of discrete morphemes that express object form or category through handshape morphemes, object location through a "base grid" of discrete spatial loci, and movement through verbal roots. Similarly, Newport (1982) proposed that " 'mimetic' forms within American Sign Language are not at all analogue in nature; rather, like morphologically complex forms in spoken language, they are constructed from a relatively small number of discrete components, which mark familiar distinctions of meaning and are combined in familiar ways" (p. 465). However, whether all meaningful components within a classifier construction are discrete morphemes has recently come into question (e.g., Liddell, 1995). In the series of experiments reported here, we investigated whether aspects of classifier constructions are treated as discrete categorical morphemes or as gradient, analogue representations.

Hockett (1960) proposed that human language exhibits a key set of properties that distinguish it from the communication systems of other species. Two of these design features concern us here: arbitrariness and discreteness. All sign language researchers agree that classifier constructions are iconic and not arbitrary in form; for example, classifier handshapes can refer to the shape of referent objects, and the location of the hands in space can refer to the location of referent objects in real space. Does this fact mean that signed languages are fundamentally different

from spoken languages? Some have answered *no* by arguing that iconicity plays no role in the grammar of ASL or in its acquisition by children (e.g., Newport, 1981). Other linguists have argued that both signed and spoken languages exhibit iconic forms (e.g., Haiman, 1985; Hinton, Nichols, & Ohala, 1994; Mandel, 1977; Taub, 2001). Signed and spoken languages differ only in the degree to which the auditory-oral and visual-gestural modalities permit motivated (iconic) linguistic forms. Human language exhibits both arbitrary and iconic relationships between form and meaning, and thus arbitrariness should not be considered a defining feature of linguistic systems. What may distinguish human language from the communication systems of other species is that some iconic form-meaning mappings become less iconic (more arbitrary) over time. Aronoff, Meir, Padden, and Sandler (chap. 3, this volume) argue that classifier constructions in older signed languages (e.g., ASL) exhibit more arbitrary components than younger signed languages (e.g., Israeli Sign Language or Nicaraguan Sign Language).

Whether a form is iconic is independent of whether it encodes discrete or gradient information; a form (or aspects of a form) can be both iconic and categorical or iconic and analogue. Morphemes in spoken languages are discrete, rather than analogue. For example, reduplication is a common (iconic) morphological process indicating plural, but no language indicates number continuously via repeated reduplication. In Indonesian, *orang* means 'man', and *orang-orang* means 'men', not 'two men', and *orang-orang-orang* does not mean 'three men', etc. With respect to defining an analogue system, We do not follow the definition suggested by Meier (1982). Following Goodman (1968), Meier (1982) distinguishes discrete (digital) from analogue systems using a clock as an example:

> If the minute hand is understood to indicate only 60 divisions of the hour, then the clock is being read in a digital fashion. However, suppose the demarcations into minutes are used solely as guides and that each of the infinitely large number of points through which the minute hand sweeps is considered to be significant. Each of those points would then constitute a character in an analogue symbol system. (p. 8)

Under this definition, the hypothetical reduplicative number example would constitute a discrete rather than analogue system.

In contrast, I define an analogue system as one in which there is (a) an iconic relation between the linguistic forms and their meaning, and (b) the forms constitute a continuum, but not an infinitely divisible one. Rather, a continuum within an analogue communicative system is gradient (i.e., nondiscrete), consisting of many forms that do not have clear and definable boundaries between them. *Analogue* does not imply a metric system in which the slightest change in form indicates a change in meaning; rather, a general isomorphism is implied in which cognitive and perceptual factors can influence the degree to which a change in form is associated with a change in meaning. An analogue system contrasts with a *categorical system* in which forms are listable discrete entities that may or may not be iconic. In a categorical system, a category may contain many members (e.g., some languages have over 100 distinct noun classifiers; Dixon, 1986), but there is no systematic iconic relationship between the form of the category members and their meaning. That is, the category members do not constitute an isomorphic continuum of form and meaning.

There is fairly good linguistic evidence that classifier handshapes are discrete morphemes. First, they can be specified phonologically within any model of sign phonology that has been proposed (e.g., Brentari, 1998; Liddell & Johnson, 1989; Sandler, 1989). For example, within most models, the F classifier handshape would be represented within a feature hierarchy in

which the selected fingers are specified as the thumb and index finger and the unselected fingers are specified as extended (a full specification of the F-handshape involves additional features). The ability to phonologically specify classifier handshapes is evidence that there are discrete boundaries between forms. Second, syntactic and morphological constraints must make reference to categories of classifier handshapes. For example, instrument classifier handshapes are associated with the internal argument of the verb, such that if the predicate is inflected with the exhaustive morpheme, this morpheme is interpreted as referring to the object of the verb and not the subject (Brentari & Benedicto, 1999).[1] Another example of a morphosyntactic constraint on classifier handshapes is that whole entity classifier handshapes do not permit other classifiers to be located on them (Liddell & Johnson, 1987). For example, in ASL, it is ungrammatical to place a 1-handshape (for upright humans) on top of the vehicle classifier handshape to indicate 'the man is standing on top of the car'. However, the 1 classifier handshape can be placed on top of a surface classifier handshape (e.g., a B-handshape) to indicate 'the man is standing on the roof of the car'.

In contrast to classifier handshapes, Liddell argued that there is very little evidence that locations within signing space are discrete morphemes (Liddell, 1990, 1995, 2000a). First, no phonological model proposed thus far is able to specify locations in signing space. The inability to formally specify spatial locations is evidence that linguistically definable form boundaries do not exist. Second, although there are phonological rules that refer to particular planes in signing space (Brentari, 1998), there do not appear to be rules that refer to distinct locations within a plane. Third, there appears to be an unlimited number of locations within signing space into which classifier handshapes may be placed (Liddell, 1995). Based on this evidence, Liddell (1995, 2000a) proposed that locations in signing space are neither listable nor morphemic.

Given this linguistic data, we investigated whether handshape or spatial location within a classifier construction are treated as categorical morphemes or as gradient, analogue representations. Specifically, we examined whether ASL signers interpret gradient and continuous variation in form, either in classifier handshapes or in locations in signing space, as reflecting continuous variation in size or spatial location. In addition, we further investigated whether signers spontaneously produce gradient variation in handshape or spatial location in order to express gradient variations in size or location. We hypothesized that locations in signing space are mapped isomorphically to locations in physical space, but that hand configurations are treated categorically as morphemic representations.

EXPERIMENT 1A

Interpretation of Gradient Variation in Location

Experiment 1A was designed to determine whether Deaf ASL signers and/or hearing nonsigners exhibit gradient or categorical performance when interpreting spatial locations along a continuum. Specifically, participants were asked to interpret ASL descriptions of a simple geometric configuration: a dot at various locations either above or below a bar. For nonsigners, these ASL descriptions would be treated as gestural depictions of the dot's location with respect to the bar. For these individuals, there is no possibility of *linguistic* spatial categories expressed by the stimuli. Comparison of data from signers and nonsigners thus provides critical insight into the linguistic versus cognitive structuring of spatial relations.

Studying nonlinguistic spatial categorization, Huttenlocher, Hedges, and Duncan (1991) found that nonlinguistic spatial categories affected participant's memory for the locations of dots presented inside a large circle. Specifically, they found that dot locations were reproduced farther from the cardinal axes and nearer to the diagonal angular locations, than they actually were. Huttenlocher et al. (1991) explained this pattern of bias as resulting from categorization. Huttenlocher et al. (1991) hypothesized that when participants reproduced object locations, memory for a particular location is combined with information about the spatial category in which that object appeared, causing reproductions to be biased toward the prototype of the category and away from category boundaries. The category boundaries were the central horizontal and vertical axes, and the spatial prototypes lay within the diagonal quadrants of space. The finding of spatial bias away from the cardinal axes and toward the diagonal quadrants has recently been replicated by Crawford, Regier, and Huttenlocher (2000), and the stimuli in that study were parallel to the response stimuli for Experiment 1 (a dot and rectangular bar). In the Crawford et al. (2000) and Huttenlocher et al. (1991) studies, participants distinguished all of the dot locations (they did not confuse locations or group them together), but they exhibited a systematic bias away from the central axes.

Similarly, we may find that signers and nonsigners distinguish all locations depicted by the ASL classifier constructions, but with a systematic bias dictated by nonlinguistic spatial categorization. Such a finding would indicate that ASL signers interpret the location of the hands in signing space as they would objects in real (nonsigning) space. On the other hand, if ASL signers perform differently from hearing nonsigners and group similar locations together, it would suggest that signers interpret signing space as divided into linguistic categories (and further language-internal evidence would be needed to verify these categories).

Method

Participants. Ten Deaf ASL signers participated. Nine signers were from Deaf families and acquired ASL from birth, and one signer acquired ASL in adolescence. Ten hearing participants who had no knowledge of ASL also took part in the study.

For all experiments, Deaf participants were tested either at Gallaudet University in Washington, DC, or at The Salk Institute in La Jolla, CA, and were paid for their participation. The hearing participants were students at the University of California, San Diego, and received course credit for participating in the study.

Materials and Procedure. Participants were asked to place a dot (a ½ inch round sticker) in relation to a bar (a line) drawn in the center of a square frame. Where the sticker should be placed was indicated by a native signer (on videotape), who produced a classifier construction in which the F handshape (specifying a small round object—the dot sticker) was positioned in signing space either above or below a horizontal B-handshape (specifying a flat, surface-prominent object—the bar). Hearing nonsigners were instructed to place the sticker in relation to the bar as indicated by the gestures shown on the video. They were instructed that the F-handshape (the "OK" gesture) represented the dot and the B handshape represented the bar.

The location of the F-handshape was positioned in one of 30 possible locations (roughly a 5 X 3 grid above and a 5 X 3 grid below the B handshape), as illustrated in Fig. 10.1. The signer was able to produce such fine distinctions because a grid was placed on a monitor connected to the video camera. Thus, she was able to consistently place her hand at each of the 30 distinct locations within the grid. These productions were digitized, randomized, and edited onto two test

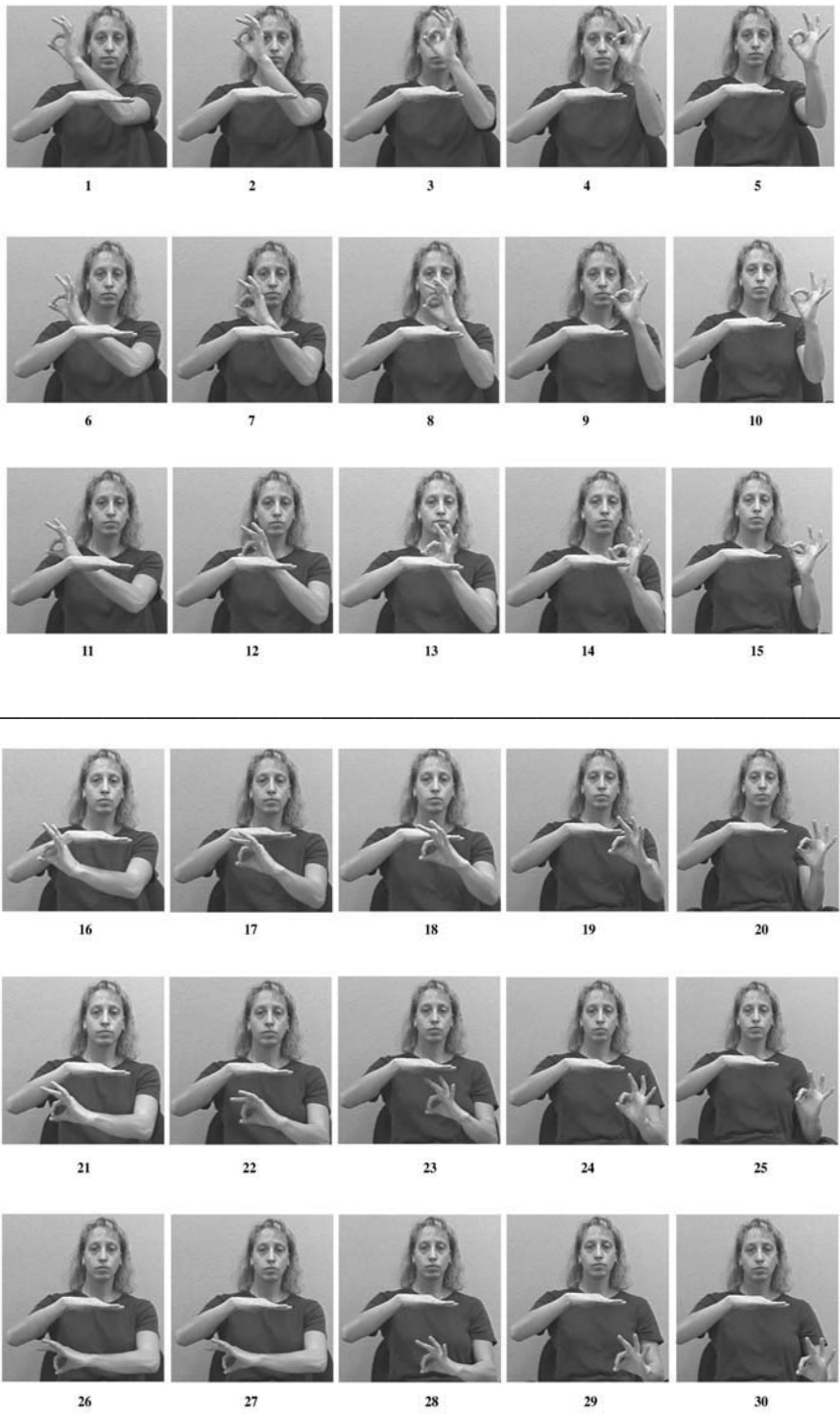


FIG. 10.1. Illustration of the classifier constructions specifying 30 distinct locations (A) above the bar and (B) below the bar. These still images were captured from a test videotape.

videotapes with two different random orders (half the participants received order 1 and half order 2). For each tape, there were four warm-up items. For these items, the ground object was a circle, and the signer on the videotape indicated the location of a dot with respect to the circle, using a baby C-handshape to represent the circle and an F-handshape to represent the dot. Following these practice items, there were 30 test items, each preceded by a number corresponding to a number on the participant's response sheet. The test response sheets consisted of a square frame with a bar in the center, and the response sheets for the practice items had a large circle within the frame. The square frame provided grounding for locations with respect to the bar on the page. Participants were provided with a sheet of stickers and were asked to place one sticker on each page within the square frame, according to the description shown on the videotape.

Results

To determine whether signers and nonsigners differed in their interpretation of the classifier constructions indicating dot locations, we analyzed their sticker placements, using grid coordinates superimposed on the square frame of the response sheets. The dimensions of the grid were 15.5 cm X 17.8 cm, and the grid was divided into 3 mm increments. The *X*,*Y* coordinates for the center of the sticker on each response sheet was determined for each participant. A few of the Deaf participants consistently "reversed" the left–right locations observed on the videoscreen, interpreting the ASL descriptions as from the signer's point of view. Thus, a location observed on the right of the videoscreen was placed on the left of the response sheet because it was on signer's left. None of the hearing nonsigners interpreted the ASL stimuli in this manner. For the purposes of our analyses, the reversed responses were "flipped," so that all sticker placements were from the same viewpoint.

The data were analyzed using the ResamplingStats (Bruce, Simon, & Oswald, 1995) instantiation of the randomization test methodology (see, e.g., Lunneborg, 2000). In these analyses, conducted separately for each dot location, the randomization distributions for the location differences along the *X* and *Y* dimensions as well as the within-group distances among subjects were established by generating 10,000 random divisions of the data into two groups of the same sizes as the hearing and non-hearing groups in the study. Comparison of the observed differences on the x and y axes as well as the within group distances from the group means of the actual data indicated that there were no statistically significant differences (at the alpha = .05 level) between the hearing and Deaf groups on either axis (vertical or horizontal) in terms of the differences in within-group distances. The results are illustrated in Fig. 10.2.

As can be seen in Fig. 10.2, both groups of participants exhibited a bias for placing stickers at locations away from the central vertical axis. That is, when the signer indicated spatial locations that were slightly off the central vertical axis, participants placed the stickers farther from the central axis than would be expected (e.g., positions numbered 2, 4, 7, 9, 12, and 14 for above the bar, and 17, 19, 22, 24, 27, and 29 for below the bar). In addition, at each location, the Deaf signers tended to displace the sticker slightly toward the ground object (the bar), compared to the hearing nonsigners.

Finally, the data from the one ASL signer who was a late-learner does not differ from the data from the native and near-native signers; the results remain unchanged if this participant is excluded. Similarly, for Experiments 1B to 1C and 2A to 2C, the results are unaltered if the few late-learners of ASL are excluded from the analysis.

Discussion

Both signers and nonsigners exhibited gradient, analogue performance when comprehending locations in signing/gesture space. Both groups distinguished most of the target spatial locations, as shown in Fig. 10.2. Deaf signers did not appear to group similar locations together as members of a linguistic spatial category, and there was no difference between Deaf signers and hearing nonsigners in their ability to interpret locations expressed by ASL classifier constructions. The fact that signers distinguished nearly 30 locations within signing space argues for an analogue system, unless one assumes that there are 30 separate location morphemes within the vertical plane of signing space. Linguistic categories can contain many morphemes, but there is no systematic iconic relation between form and meaning that holds across all morphemes within the category. Independent linguistic evidence would need to be presented to argue for 30 distinct morphemes.

These findings are consistent with the sign/gesture production results of Singleton, Morford, and Goldin-Meadow (1993). Singleton et al. asked hearing adults to use gestures (without speech) to describe videotaped vignettes that were designed to elicit classifier constructions (verbs of location and motion) from Deaf ASL signers. The authors reported "very little difference among all of the participants on the motion/location morphemes" and that "the gestures produced by novice gesturers resembled ASL in terms of motion and location but not in terms of handshape" (p. 699). Thus, hearing nonsigners do not differ from Deaf signers in either (a) the ability to use space to indicate location, or (b) their interpretation of location distinctions.

In addition, both signers and nonsigners exhibited a bias to reproduce locations away from the central vertical axis. We propose that this response bias is due to the nature of nonlinguistic spatial categories. In general, discrimination and estimation biases are away from category boundaries and toward the prototypes of a category (e.g., Harnad, 1987; Huttenlocher, Hedges, & Prohaska, 1988). Results from previous studies indicate that for the type of stimuli used in this

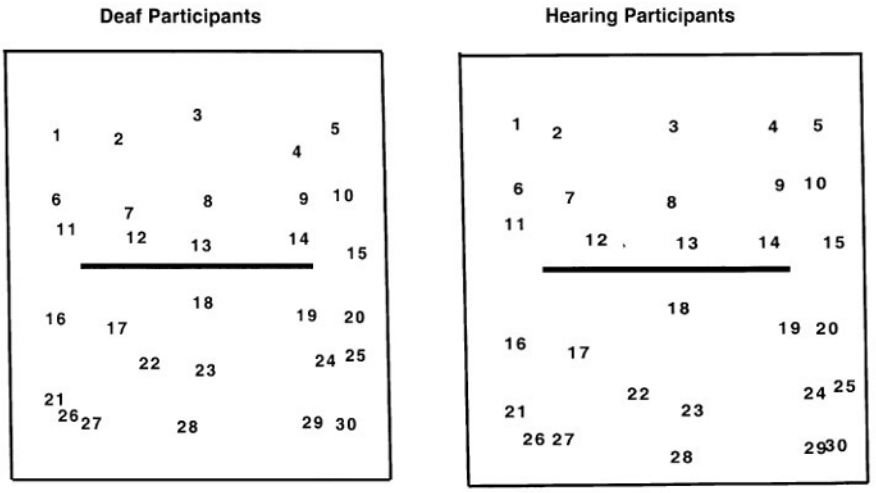


FIG. 10.2. Results from Experiment 1A. The numbers correspond to the numbered stimuli in Figures 1A and 1B. The numbers are centered on the mean *X*/*Y* coordinates for each sticker placement for 10 Deaf signers and 10 hearing nonsigners.

experiment, the central vertical axis is a category boundary and the diagonal quadrants are the spatial prototype (Crawford et al., 2000). Thus, the results from Experiment 1A suggest that the spatial categorization used by Deaf signers to interpret locations expressed with ASL classifier constructions is not specifically linguistic in nature. Rather, the data indicate that locations in sign/gesture space are interpreted with respect to nonlinguistic spatial categories, available to both signers and nonsigners.

However, there was one respect in which the performance of ASL signers differed from hearing nonsigners. Signers exhibited a bias for placing stickers toward the reference object (the bar). The mean sticker locations for the Deaf participants were displaced slightly toward the bar, compared to the hearing nonsigners (see Fig. 10.2). We hypothesize that the Deaf participants' bias toward the reference object reflects the fact that for signers, the two hands are viewed as forming a linguistic construct that must be integrated, rather than as somewhat independent gestures. That is, signers treated the stimulus as a two-handed classifier construction predicating location, whereas hearing nonsigners may have treated the stimulus as a gestural depiction with no constrained relation between the two hands. The linguistic relation between the hands may have caused Deaf signers to place the stickers closer to the bar because when two entities (in this case the hands) are interpreted as part of a functionally related construct, such entities are often interpreted as connected and thus closer together (e.g., Coventry, Prat-Sala, & Richards, 2001).

EXPERIMENT 1B

Acceptability Judgments for Gradient Expressions of Location

This experiment further explored whether signers (and nonsigners) treat locations in signing space as categorical representations or as analogue, gradient representations of locations in physical (nonsigning) space. Specifically, Experiment 1B investigated whether signers and nonsigners judge similar expressions of location as equally good descriptions of a target location. The study is based on an experiment by Hayward and Tarr (1995) that investigated English speakers' acceptability judgments for prepositions (*above*, *below*) and directional terms (*left*, *right*). In their study, participants were shown pictures of a circle (the figure object) in one of 48 positions around a ground object (a square TV). For each picture, participants judged how well each spatial term described the relationship between the figure and ground objects. Hayward and Tarr (1995) found that spatial terms exhibited prominent regions of applicability along single salient axes: the vertical axis for *above* and *below*, and the horizontal axis for *left* and *right*. As the figure object moved away from the central axes, applicability ratings decreased. Thus, English spatial terms categorize certain figure object locations (those along the central axes) as equally good members of the linguistic spatial category denoted by each term, and other locations (those far from the central axes) as poorer exemplars.

Adopting Hayward and Tarr's (1995) experimental technique, we investigated whether ASL signers accept a range of locations as equally good exemplars of an ASL spatial expression (the classifier constructions shown in Fig. 10.1) or whether only a single location is given the highest applicability rating (indicating noncategorical performance). Experiment 1B provides another measure of the sensitivity of ASL signers to gradient locative distinctions within signing space, and by comparing signers and nonsigners, we can determine the relative contributions of linguistic knowledge versus a general ability to match hand gestures with a visual scene.

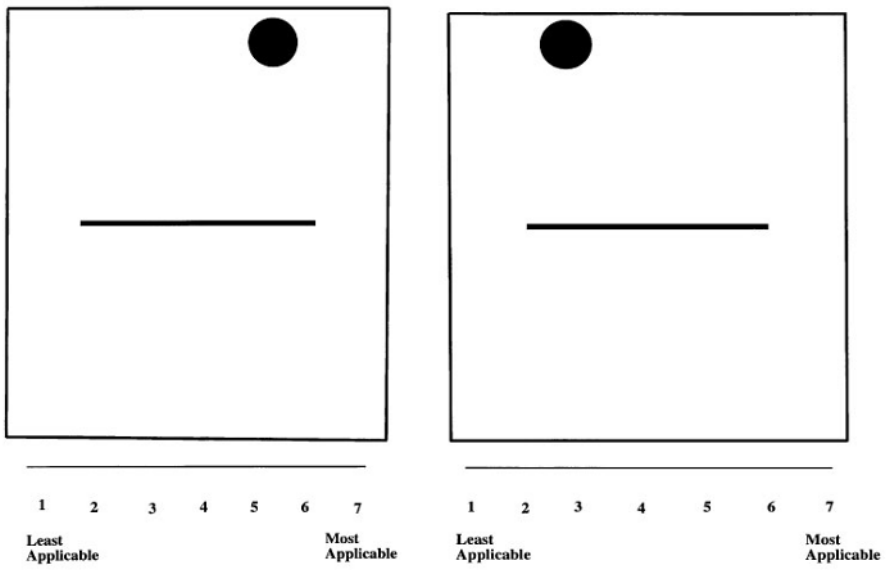


FIG. 10.3. Example rating sheets for Experiment 1B. For experiment 1C, 30 of these dot and bar pictures were presented to individual signers, but without the rating scale.

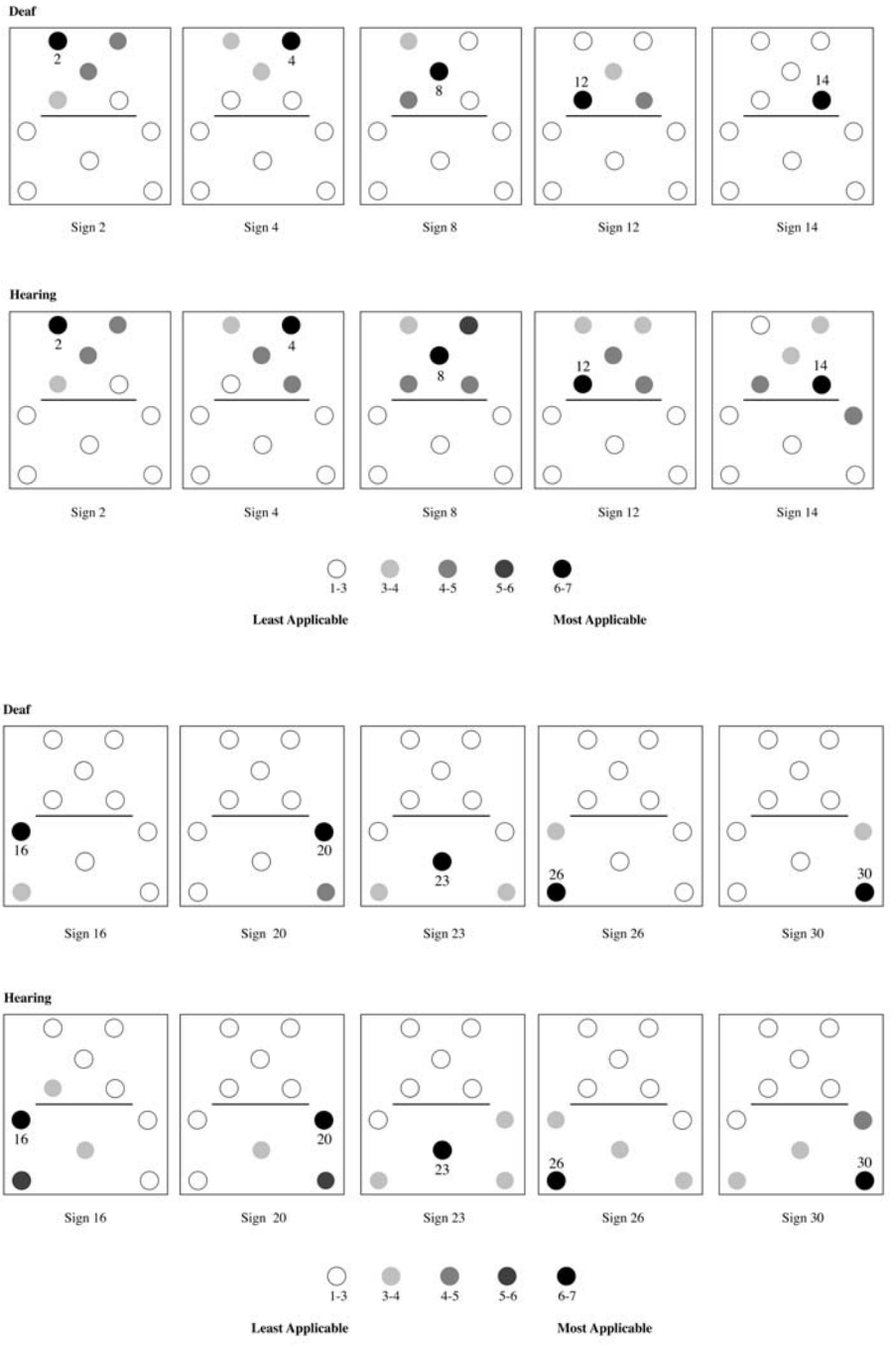
Method

Participants. Ten Deaf ASL signers participated, and none had participated in Experiment 1A. Five signers were from Deaf families and had acquired ASL from birth, three signers were from hearing families and began acquiring ASL prior to age 3, and two signers acquired ASL at age 12. Ten hearing participants who had no knowledge of ASL also took part in the study, and none had participated in Experiment 1A.

Materials and Procedure. Participants viewed a subset of the classifier descriptions of the dot and bar from Experiment 1A, along with pictures showing the dot in relation to the bar (see Fig. 10.3). Participants were asked to rate how well a given expression described or depicted a given picture on a scale from 1 (*least applicable*) to 7 (*most applicable*). Each picture contained a bar in the center of a square frame and the dot appeared in one of 10 possible positions (5 above and 5 below the bar). Each picture was paired with each classifier construction (10 expressions representing 10 different positions) for a total of 100 trials. Four practice items (with a circle as the ground object) preceded the test trials. The hearing nonsigners were asked to rate the applicability of the gesture for each picture (i.e., how well the gesture matched the picture).

Results and Discussion

The data are illustrated in Figs. 10.4A and 10.4B. Each circle in this figure represents a target picture (see Fig. 10.3 for individual examples), and higher applicability ratings are denoted by darker shading. The results indicate that both hearing and Deaf groups exhibited analogue,



FIGS. 10.4A and 10.4B. Graphic display of the average applicability ratings from Experiment 1B. The sign numbers underneath each display refer to the classifier constructions shown in Fig. 10.2. Each sign was paired with a picture of a dot in each of the locations shown in the display. The shading indicates the mean applicability rating for that sign for each dot location.

rather than categorical performance. As can be seen in Fig. 10.4, similar spatial locations were not grouped together as equally good examples of a sign/gesture description. The target spatial location always had the highest acceptability rating for both groups. In fact, for the Deaf signers, no location (other than the target location) received an applicability rating higher than 4 or 5 (middle of the applicability range). In contrast, for hearing nonsigners, some nontarget locations had mean applicability ratings between 5 and 6 (e.g., for signs 16 and 20, see Fig. 10.4B). Furthermore, hearing nonsigners provided higher acceptability ratings for nontarget locations compared to Deaf signers.

The fact that only the target location received the highest applicability rating indicates that Deaf signers do not accept a range of locations as equally good examples of locative classifier construction, at least for the locative expressions investigated here. In fact, Deaf ASL signers were more attuned to the match between signing space and physical space, compared to hearing nonsigners. Hearing nonsigners tended to provide slightly higher acceptability ratings for spatial locations near the target location, compared to Deaf signers. These results complement those of Experiment 1A. Both studies indicate that Deaf signers interpret locations in signing space as analogue representations of physical space. The data do not support an analysis in which locations in signing space are treated as categorical morphemes, unless one assumes that there are precisely 30 distinct morphemes in the vertical plane of signing space.

EXPERIMENT 1C

Production of Location Contrasts

Thus far, we have examined how ASL signers interpret gradient locations in signing space, but the question remains: Do signers actually produce classifier constructions with gradient location distinctions? The ASL stimuli used in Experiments 1A and 1B were produced by a signer who knew the set of contrasts and consciously (with the aid of a grid on a video monitor) produced classifier constructions that distinguished 30 locations in signing space (Fig. 10.1). In Experiment 1C, we investigated whether signers who were naive to the contrast set would produce descriptions of the dot location that were analogue. To assess whether signers produced ASL descriptions that distinguished each of the 30 dot locations, their ASL descriptions were edited together and shown to a second group of ASL signers who performed the sticker placement task of Experiment 1A. The performance of this second group of signers indicates whether signers produce gradient or categorical descriptions of location. The technique of assessing gradient versus categorical ASL descriptions by measuring how those descriptions are interpreted was pioneered in an unpublished study by Schwartz (1979), conducted with Newport and Supalla.

Method

Participants. Thirty Deaf ASL signers participated, and none had participated in Experiments 1A or 1B prior to participating in Experiment 1C. Twenty-three signers were from Deaf families and had acquired ASL from birth, four signers were from hearing families and began acquiring ASL prior to age 6, and three signers acquired ASL in adolescence.

Materials and Procedures. Each of the 30 Deaf signers was asked to describe a set of five simple line drawings. The first two pictures were "warm-up" pictures (a clock above a desk and a circle with a dot next to it). The third picture was one of the 30 dot and bar pictures from Experiment 1B (two examples are shown in Fig. 10.3, without the rating scale), and the fourth picture was a picture of a medallion on a necklace (see Experiment 2C). The fifth picture was a final distractor picture (a sun above a horizon). Thus, each person saw a different dot and bar picture, and no one saw the entire set. Participants were simply told to provide a brief description of each picture; they were told that a lot of detail was not necessary.

Results

All 30 Deaf signers used ASL classifier constructions to describe the location of the dot with respect to the bar. The majority of signers used an F-handshape to represent the dot; other handshapes used to represent the dot were an O-handshape and a baby C-handshape. To represent the line, all signers used a tracing construction to indicate the extent of the bar. Signers generally used either an I-handshape (pinky extended, usually two-handed) or a G-handshape (thumb and index finger extended) to trace a line in space, representing the bar.

Whether the descriptions of the dot location were categorical or gradient was determined by showing a videotape of the 30 descriptions (each by a different signer) to another group of six Deaf ASL signers (all of whom were from Deaf families and acquired ASL from birth). Two test videotapes were created by digitizing, editing, and randomizing the descriptions of each dot location, and two random orders were created (three signers viewed order 1, and three viewed order 2). Data were analyzed as in Experiment 1A, using grid coordinates to determine the mean sticker placement for each dot location description.

As can be seen in Fig. 10.5, the relative location of the majority of dot locations (26/30) was maintained. As in Experiment 1A, the sticker locations were skewed away from the central vertical axis and toward the diagonal quadrants. Although not all 30 locations were distinguished, signers clearly produced locative expressions that were gradient, rather than categorical. A separate group of Deaf signers was able to correctly identify the relative position of most of the target dot locations described with ASL classifier constructions.

Discussion

One of the clear differences between the data shown in Fig. 10.5 and the data shown in Fig. 10.2 from Experiment 1A is that the data in Fig.10.5 show a much stronger effect of the bias away from the central vertical axis (the category boundary) and toward the diagonal within a quadrant (the category prototype). This stronger bias is most likely due to a repetition effect. That is, the first group of 30 Deaf signers may have exhibited a reproduction bias when they mapped the dot location observed on the picture to a location in signing space. Then, the second group of Deaf signers may have repeated this bias when placing stickers on the response pages (i.e., when mapping the location of the signer's hand in signing space to a location on the response sheet). This type of increasing bias effect in serial reproductions was found in an early spatial perception study by Taylor (1961).[2] Participants in this study memorized the location of a dot on an index card and then were instructed to reproduce the dot on a blank card; this reproduction was used as the stimulus for the next participant, and so on. Taylor (1961) found that dot reproductions drifted toward the corners of the card with successive copies. Similarly, successive reproduc-

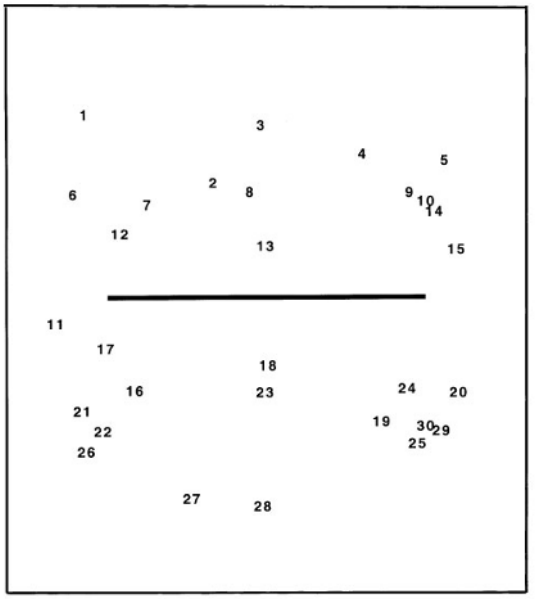


FIG. 10.5. Results from Experiment 1C. Each number corresponds to the dot location described by one of 30 ASL signers. Each dot appeared in one of 15 positions above the bar or one of 15 positions below the bar (examples of two stimuli are shown in Fig. 10.3, but without the rating scale). These location descriptions were shown to a separate group of 6 Deaf signers, and the numbers are centered on the mean *X*/*Y* coordinates for the sticker placements of

tions of dot locations (first as ASL classifier constructions and then as sticker placements) enhanced the spatial bias effect in our experiment.

In summary, the results of all three experiments indicate that locations in signing space are treated as analogue representations that are mapped isomorphically to locations in physical space. Deaf ASL signers and hearing participants with no knowledge of ASL performed similarly when asked to interpret ASL classifier constructions that varied continuously in location (Experiment 1A). Both signers and nonsigners provided similar applicability ratings for ASL classifier expressions of location, assigning only target locations the highest rating (Experiment 1B). Finally, Deaf ASL signers who were naive to a contrast set of 30 locations of a figure object (the dot) produced descriptions that were analogue and gradient. The results of Experiments 1A and 1C indicated that signing space is susceptible to the same spatial category effects observed for nonlinguistic space: specifically, a bias away from the central vertical axis (a spatial category boundary) and toward the diagonal quadrants, hypothesized to be nonlinguistic spatial prototypes (Crawford et al., 2000).

The results of Experiment 1C contrast sharply with the results of the same spatial description study conducted with native English speakers (Emmorey, 2000). In this study, English speakers were not able to correctly identify the 30 target locations described in English by another set of speakers (parallel to the ASL study, speakers described only one of the 30 dot and bar pictures, and their descriptions were randomized and played to a second set of participants who performed the sticker-placement task). Unlike the ASL descriptions, the English descriptions did not preserve relative locations in space; rather, the descriptions tended to categorize space primarily along a

vertical dimension (describing the dot as either *above* or *below* the bar) and secondarily along a horizontal dimension (describing the dot as *above/below* and to the *right* or *left*).

It is important to point out that the data do not suggest that ASL has grammaticized metric notions. For example, an ASL classifier construction produced in this study could not be accurately translated as 'The dot is 3 inches above and two inches to the left of the bar.' Like spoken languages, ASL does not contrast metric spatial distinctions. Rather, ASL exhibits grammatical specifications which are relativistic or topology-like, as do spoken languages (see Talmy, chap. 8, this volume). What is unique about signed languages is the schematic and isomorphic mapping between linguistic and cognitive representations of space. A more accurate translation into English of the ASL classifier constructions produced by signers in Experiment 1C (and by the signer on the test videotape in Experiments 1A and 1B) would be 'A bar is located here, and a dot is located here.' This English translation would be accompanied by a gesture indicating the relative location of one object with respect to another—the locations of the hands in space indicate the relative locations of the objects described in the speech. For ASL, the type of object is expressed by the classifier handshape within a signed description, but the location of the objects is not expressed by a morphemic location in signing space. Rather, the spatial locations of the figure and ground objects are expressed gesturally, as suggested by the proposed English translation (see Liddell, 1996, for a comparison of this type of gesture in English and ASL).

EXPERIMENT 2A

Interpretation of Gradient Variation in Handshape to indicate Size

We now turn to the question of whether classifier handshapes are treated as gradient, nonmorphemic, analogue representations. This question was first addressed by Schwartz (1979), using a methodology similar to that in Experiments 1C and 2C. Our first experiment with handshape was designed to parallel Experiment 1A. Specifically, participants were asked to interpret ASL descriptions of the size of a medallion on a necklace, and these descriptions were produced by continuously varying the form of the handshape to represent increasing size. As in Experiment 1A, both signers and nonsigners participated. If both groups interpret the handshape size continuum in the same manner, it would suggest that ASL signers do not group similar handshape forms together as members of a linguistic category. On the other hand, if ASL signers perform differently from hearing nonsigners, it would suggest that ASL signers interpret handshapes with respect to categorical linguistic representations.

Method

Participants. Ten Deaf ASL signers participated. Six signers were from Deaf families and had acquired ASL from birth, three were from hearing families and began acquiring ASL prior to age 5, and one had acquired ASL in adolescence. Ten hearing participants who had no knowledge of ASL also took part in the study.

Materials and Procedure. Participants viewed a videotape of a native ASL signer describing the shape of a medallion hanging from a necklace. The signer produced a continuum of 10 handshapes from a "squeezed" F (index finger contacts the base of the thumb) to a wide baby C handshape (representing a very small to large round flat object), as shown in Fig. 10.6. These 10

FIG. 10.6. Illustration of the continuum of handshape sizes used to describe a medallion in Experiment 2A; examples 1 through 5 utilize an F-handshape, whereas examples 6 through 10 utilize a baby C-handshape. These still images were captured from a test videotape.

productions were digitized, randomized, and edited onto three test videotapes with three different random orders (in each group, three participants viewed tape 1, four viewed tape 2, and three viewed tape 3). Subjects chose from a set of 10 stickers that varied continuously in size (from ¼ inch to 2 ½ inches in diameter) and placed the sticker at the end of a necklace chain hanging from the neck of a person in a drawing, as shown in Fig. 10.7. Prior to the 10 test items, there were two practice items in which the signer on the videotape described the size of a rectangular badge on the side of the chest, using either an H-handshape or a B-handshape. For the practice items, participants could choose 1 of 2 badge sizes, with each size of sticker in a different envelope. For the test items, circular stickers were in 10 separate envelopes, each containing at least 10 stickers, and each labeled with the sticker size that it contained; thus, participants were free to use the same sticker size for any or all of the test items. Hearing participants were told that the woman on the videotape would use a gesture to describe the size of the medallion hanging on the necklace and that they would have to decide which sticker matched the gesture representing the medallion. Deaf ASL participants were given similar instructions, except that they were told that the woman would describe the size of the medallion in ASL. On the videotape, the signer always

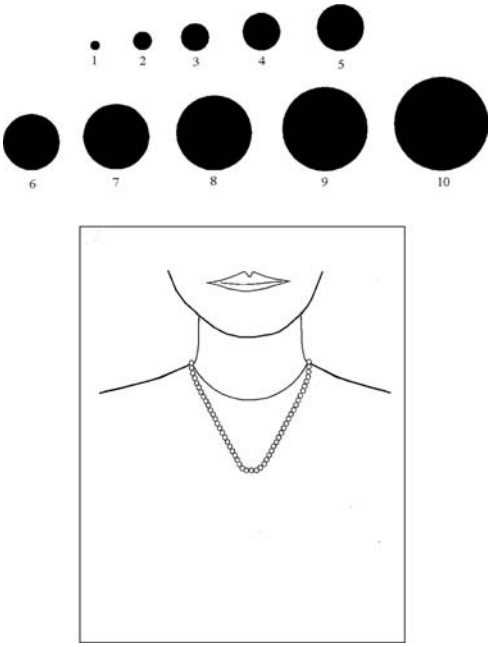


FIG. 10.7. Illustration of the continuum of medallion sticker sizes from Experiment 2A and the response sheet.

first produced a two-handed tracing construction (with 1-handshapes) that described the V-shape of the necklace, and then she produced a one-handed classifier handshape indicating the size of the medallion (as shown in Fig 10.6).

Results

The results are shown in Fig. 10.8. The data are divided into responses to the five handshapes made with an F hand configuration (indicating smaller medallion sizes) and the five handshapes made with a baby C hand configuration (indicating larger medallion sizes). As can be seen in Fig. 10.8, the Deaf participants were clearly sensitive to the gradient forms of handshape, but the hearing nonsigners were much less sensitive to the relation between handshape size and medallion size. For the F-handshapes, there was a significant correlation between handshape size and medallion size choice for the Deaf participants ($r^2 = .75$; $F(1, 49) = 143.6$, $p < .001$), and the correlation was also significant, but much weaker, for the hearing participants ($r^2 = .33$; $F(1, 49) = 23.9$, $p < .001$). However, the correlation for the hearing participants primarily reflects the contrast between the "squeezed" F-handshape (the continuum endpoint) and the other F handshapes. When this handshape is not included in the analysis, there is no correlation between handshape size and choice of medallion size for the hearing participants ($r^2 = .06$), but the correlation remains strong for the Deaf participants ($r^2 = .61$; $F(1, 40) = 61.4$, $p < .001$). Similarly, for the baby C-handshapes, there was a significant correlation between handshape size and medallion size for the Deaf participants ($r^2 = .51$; $F(1, 49) = 50.0$, $p < .001$), but there was no correlation for the hearing participants ($r^2 = .01$).

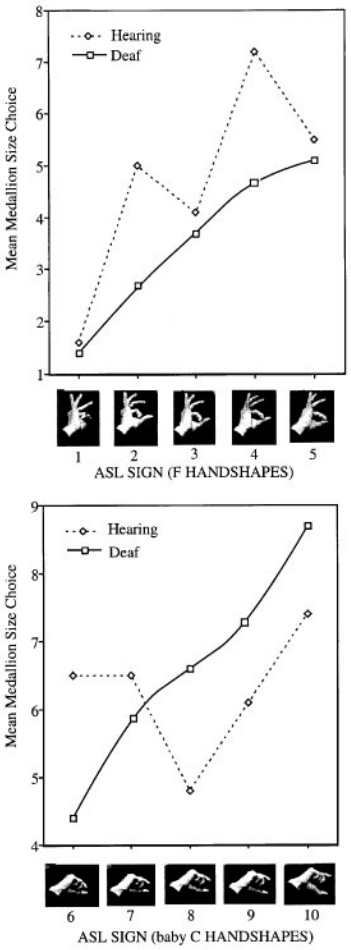


FIG. 10.8. Results from Experiment 2A: Interpretation of gradient variation in handshape to indicate size. The numbers on the Y axis indicate medallion sticker size from smallest (1) to largest (10), as shown in Fig. 10.7.

Discussion

Contrary to our initial hypothesis that classifier handshapes would be treated categorically, Deaf ASL signers exhibited analogue and gradient performance when comprehending size expressed through handshape. In contrast, hearing nonsigners were generally insensitive to the relation between handshape form and medallion size. Thus, hearing nonsigners and Deaf ASL signers performed quite differently when interpreting the relation between handshape size and physical size, and this result contrasts sharply with the results with spatial location in Experiment 1A. In Experiment 1A, we found that hearing nonsigners performed similarly to Deaf signers when interpreting the relation between signing/gesture space and physical space. The fact that hearing and Deaf participants performed quite differently when interpreting gradient handshape sizes suggests a linguistic effect.

Specifically, Deaf ASL signers know that an F classifier handshape (as opposed to a baby C-handshape) indicates a relatively small circular size. Hearing nonsigners have no such prior linguistic knowledge, and when presented with an F-handshape, they were just as likely to choose a large medallion size as a small medallion size. Presumably, if hearing nonsigners were shown the ASL handshape variants in order, from the squeezed F to the widest baby C hand configuration, they would recognize the size difference and the relation between handshape form and medallion size. However, the sign stimuli were presented in random order to these participants and without knowing the continuum of handshapes in advance, they were generally insensitive to the differences in handshape form.

In contrast, Deaf signers were exquisitely sensitive to the relation between gradations in handshape size and the physical size of the medallion, even when the stimuli were presented in random order. It appears that Deaf signers, unlike hearing nonsigners, know which aspect of the linguistic form can be manipulated in an analogue fashion to indicate gradient size information. This type of knowledge is not unique to sign language. That is, hearing English speakers also know which part of a word can be manipulated to convey analogue, gesture-like information. For example, speakers know to lengthen the vowel rather than the consonants of a word to convey variation in duration or length (Okrent, in press). Speakers say *looooooong*, not **lllllllong*, or *longngngngng*, to convey extended length. The fact that hearing nonsigners were generally insensitive to variation in handshape size indicates that (a) Deaf signers drew on their linguistic knowledge of the semantics of handshape form (i.e., that F-handshapes refer to relatively small circular sizes and that baby C-handshapes refer to relatively large circular sizes); and (b) Deaf signers knew that these forms could be manipulated to convey analogue, gradient-size information.

Together, the results of Experiments 1A and 2A suggest that hand configuration and spatial location differ with respect to whether linguistic knowledge is necessary to interpret the form-meaning, iconic mapping. It is probably not the case that the iconic relationship between form and meaning was inaccessible to hearing nonsigners for handshape (particularly given the results presented in the next experiment). Rather, hearing nonsigners may have interpreted the F- and C-handshapes as simply indicating a round shape at the end of a necklace. Thus, when presented with a baby C-handshape, hearing nonsigners chose randomly from a large range of sizes. In contrast, Deaf signers were aware that the baby C-handshape is lexically specified to mean "relatively large" and made their sticker choices accordingly. Further, the Deaf signers noticed the small changes in hand configuration that may have been easily overlooked by the hearing nonsigners when the stimuli were presented only once in random order.

We now turn to Experiment 2B, which parallels Experiment 1B. This experiment was designed to provide further evidence regarding whether Deaf ASL signers consider classifier handshapes specifying size as members of a linguistic category or as gradient expressions of size.

EXPERIMENT 2B

Acceptability Judgments for Gradient Variations in Handshape to Indicate Size

Using the same methodology as Experiment 1B, we investigated whether Deaf ASL signers consider similar handshapes as equally good descriptions of a particular size or whether each

gradient increase in handshape size is reflected by an increase in acceptability ratings for each size. That is, do ASL signers judge a particular classifier handshape as appropriate for a range of sizes or only for one particular size? Comparison with hearing nonsigners indicate the gestural versus linguistic components of representing objects with iconic handshapes.

Method

Participants. 10 Deaf ASL signers participated, and none had participated in Experiment 2A. Nine signers were from Deaf families and had acquired ASL from birth, and one signer acquired ASL beginning at age 12. Ten hearing participants who had no knowledge of ASL also took part in the study, and none had participated in Experiment 2A.

Materials and Procedure. Participants viewed the classifier descriptions of the medallion size from Experiment 2A (see Fig. 10.6), along with pictures of a medallion of various sizes at the end of a necklace (the various-sized medallion stickers were placed at the end of the necklace shown in Figure 7). Deaf participants were asked to rate how well each expression described a given picture on a scale from 1 (*least applicable*) to 7 (*most applicable*). As in Experiment 1B, the rating scale appeared below each picture. Each of the 10 medallion-size, necklace pictures was paired with each of the 10 classifier expressions for a total of 100 trials. There were four practice items in which the pictures were drawings of a badge on the chest (two sizes) paired with two size descriptions, using either an H- or a B-handshape. Hearing participants made the same judgments as the Deaf ASL signers, but their instructions were couched in terms of matching the hand gesture to the medallion (or to the badge for the practice items).

Results and Discussion

The results are shown in Fig. 10.9. For each target handshape, both Deaf and hearing participants rated a range of sizes as acceptable (a mean rating of 5 or greater on the applicability scale). All F-handshapes (except for the squeezed F handshape) and all baby C-handshapes were rated as acceptable descriptions of at least three (and often four) medallion sizes. Medallion sizes are shown in Fig. 10.7. These results contrast with those of Experiment 1B for spatial location. In Experiment 1B, each ASL location description was rated as acceptable for only one target location; thus, signers exhibited analogue performance when comparing locations in physical space and locations in signing space. In contrast, for handshape, ASL signers exhibited categorical performance when comparing handshape size with physical size. Similar medallion sizes were grouped together as equally good examples of a signed description using variants of either an F- or a baby C-classifier handshape.

The performance of hearing nonsigners was similar to ASL signers, except that hearing participants provided higher ratings for a broader range of sizes. That is, although the highest ratings for each handshape were similar for Deaf and hearing participants as shown in Fig. 10.9, the hearing participants were much less likely to rate a handshape as unacceptable (a rating of 3 or lower). The mean number of medallion sizes that were judged as unacceptable for a given handshape by the Deaf participants was 3.7; whereas the mean number of medallion sizes that were judged unacceptable for the hearing participants was only 2.2. This difference was significant ($F(1, 18) = 5.10$, $p < .05$).

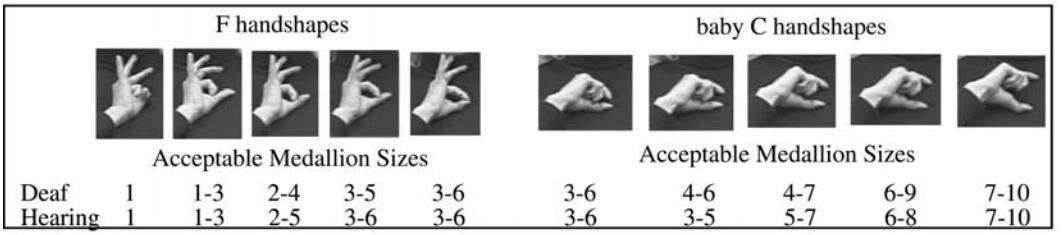

F handshapes
baby C handshapes
Acceptable Medallion Sizes
Acceptable Medallion Sizes
Deaf 1 1-3 2-4 3-5 3-6 3-6 4-6 4-7 6-9 7-10
Hearing 1 1-3 2-5 3-6 3-6 3-6 3-5 5-7 6-8 7-10

FIG. 10.9. Medallion sizes (see Fig. 10.7) rated as acceptable for each handshape (mean rating greater than 5 on the applicability scale).

In sum, the results from Experiment 2B indicate that ASL signers express sharper acceptability judgements when matching handshape size with physical size, compared to hearing nonsigners. In addition, ASL signers exhibited categorical, rather than analogue performance when rating whether a given handshape could be used to describe a given medallion size. As can be seen in Fig. 10.9, for F-handshapes, a relatively small medallion size (#3) was rated as acceptable for all but the smallest squeezed F-handshape. For the baby C-handshapes, a relatively larger medallion size (#6) was rated as acceptable for all but the widest handshape.

EXPERIMENT 2C

Production of Handshape Contrasts

Both Experiment 2A and 2B investigated the interpretation of gradient variation in handshape to indicate size. The results suggest that ASL signers treat the F classifier handshape and the baby C-classifier handshape as morphemic categories, but they are also aware of the iconic potential of these handshapes to represent gradient specifications of size. In Experiment 2C, we examine whether signers produce classifier constructions that express size in a categorical or in a gradient manner. Again, we used the technique pioneered by Schwartz (1979), in which gradient versus categorical expression is assessed by determining how classifier constructions are interpreted by another group of Deaf signers. As in Experiment 1C, participants were asked to describe a small set of pictures, and they only saw one of the necklace pictures with one of the ten medallions. Thus, the signers were naive to the contrast set of medallion sizes.

Method

Participants. Ten Deaf ASL signers participated, and none had participated in Experiments 2A or 2B prior to participating in Experiment 2C. Six signers were from Deaf families and had acquired ASL from birth, two signers were from hearing families and began acquiring ASL prior to age 6, and two signers had acquired ASL in adolescence.

Materials and Procedures. The materials and procedure were the same as Experiment 1C.

Results

To determine whether the ASL descriptions of medallion size were categorical or gradient, we showed a videotape of the 10 descriptions (each by a different signer) to another group of six Deaf ASL signers (all of whom were from Deaf families and acquired ASL from birth; these were the same signers that performed the sticker-placement task for Experiment 1C). Two test videotapes were created by digitizing, editing, and randomizing the descriptions of each medallion, and two random orders were created (three signers viewed order 1, and three viewed order 2). As in Experiment 2A, the signers chose from a set of 10 stickers that varied continuously in size and placed the sticker at the end of a necklace chain hanging from the neck of a person in a drawing, as shown in Fig. 10.7.

The results are shown in Fig. 10.10. The medallion sizes that were seen by each subject are listed on the *X* axis. For medallion sizes 1 through 5 (Fig. 10.10A), all but one participant produced a description of the medallion using an F-handshape; the signer who saw medallion size #3 produced a description with a baby C-handshape with a narrow gap between the thumb and index finger. For medallion sizes 6 through 10, all subjects produced a description of the medallion with a variant of the baby C- or C-handshapes, i.e., there was no contact between the thumb and index finger, and the unselected fingers (the middle, ring, and pinky fingers) were either open (extended) or closed. The signers who described necklaces with medallion sizes #9 and #10 used a two-handed variant, which indicates a very large size.

For medallion sizes 1 through 5, which were most often described using an F-handshape, Deaf participants did not produce analogue or gradient-size descriptions (Fig. 10.10A). There was not a significant correlation between the size of the medallion viewed and described by the participants and the medallion size chosen by a second group of Deaf signers ($r^2 = .11$; $F(1, 28) = 3.31$, ns). In contrast, for medallion sizes 6 through 10, which were described using a baby C- or C-handshape, there was a significant correlation between the medallion size viewed and described by participants and the medallion size chosen by the second group of Deaf signers ($r^2 = .46$; $F(1, 28) = 23.5$, $p < .001$). However, this correlation is primarily due to the contrast between one-handed descriptions (for medallion sizes 6 through 8) and two-handed descriptions (for medallion sizes 9 and 10). If we separate these two categories, there is no correlation between the medallion size described by participants with a one-handed construction and the medallion size chosen by the second group of signers ($r^2 = .02$; $F(1, 16)$ 1). There was also no difference between medallion size choice for the two-handed descriptions. For both descriptions, five signers chose medallion size #10, and one signer chose medallion size #9 for both descriptions.

Discussion

The results of Experiment 2C indicate that ASL signers use three classifier constructions to describe medallions of various sizes. An F-handshape was used to indicate a relatively small-sized medallion; a baby C-handshape was used to indicate a medium-sized medallion, and a two-handed construction with either a C- or baby C-handshape was used to indicate a large medallion size. However, participants did not produce gradient variations in handshape size that captured the continuous variation in medallion size. Another group of signers was unable to determine which medallion size had been seen based on the signers' descriptions. This result repli-

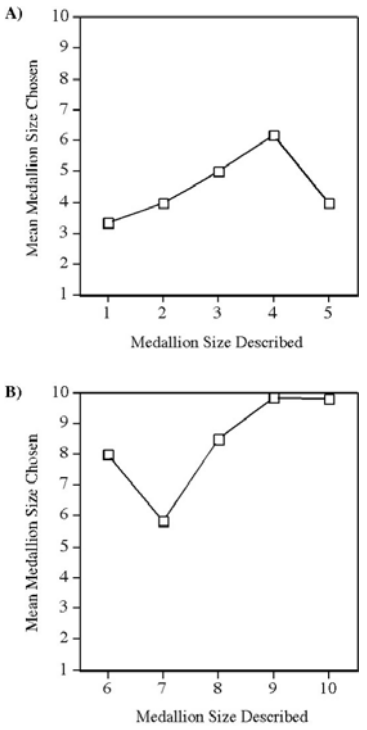


FIG. 10.10. Results from Experiment 2C: Production of handshape contrasts. The *X* axis indicates the medallion size described by each signer, and the *Y* axis indicates the mean medallion size chosen by a second group of six Deaf signers. Medallion sizes 1 through 5 in (A) were generally described with an F classifier handshape, and the medallion sizes in (B) were described with a baby C- or C-handshape (sizes #9 and #10 were described with a two-handed construction).

cates the findings of Schwartz (1979). In her study, one group of Deaf signers was shown pictures of dots that varied continuously in size (along with several other distracter pictures), and they were asked to produce a sign for each picture. Then another group of Deaf signers was shown the videotaped ASL productions and asked to choose the matching picture from the continuum of dots of various sizes. The results revealed a significant correlation between the picture choices of the Deaf judges and the pictures described by the Deaf signers across size categories (defined by the experimenter), but not within a size category (the medium-sized category was the only category with enough members to test for a correlation). Both the Schwartz (1979) study and Experiment 2C indicate that continuous variation in size is not expressed by analogue or gradient alterations of handshape size and that size is encoded categorically by a set of distinct classifier handshapes.

GENERAL DISCUSSION

The results of these six experiments support the hypotheses that were laid out at the beginning of this chapter. First, locations in signing space used to express spatial relationships are mapped in an analogue manner to the physical locations of objects in space. Previously, Supalla (1978,

1982) proposed that a limited set of *base point* or *placement morphemes* comprised a base grid system of contrasting locations. However, the evidence from Experiments 1A through 1C does not support this proposal. Second, the results from Experiments 2A through 2C showed that classifier handshapes indicating size (and shape) are treated categorically as morphemic representations, replicating the early results from Schwartz (1979), conducted with Newport and Supalla. In addition, however, results from Experiment 2A indicated that signers recognize that classifier hand configurations can be specially manipulated to express analogue information.

These findings help to clarify the relationship between linguistic representations and gestural expression in signed languages. As discussed in Emmorey (1999), signers do not produce spontaneous idiosyncratic hand gestures that are concurrent with manual signs; this is primarily because of constraints on bimanual coordination. Signers produce manual gestures that alternate with signing, and these gestures differ from those of speakers because they tend to be more conventional and iconic, are not tied to a particular lexical sign, and have different timing properties. However, signers do produce nonmanual gestures simultaneously with manual signs, for example, producing the sign, DANCE, with a body-swaying motion (suggesting the dancer's body movements) or producing the classifier predicate, ANIMAL-RUN (two hooked V-handshapes), with the tongue out, indicating the panting of a dog. The proposal here, following Liddell (2000b), is that the depictive use of signing space is a gestural component of classifier constructions, rather than a morphemic component.

Evidence presented in Experiments 1A through 1C indicated that ASL signers represent spatial locations in a gradient fashion, not in terms of morphemic categories. In Experiment 1A, both signers and nonsigners exhibited the same analogue performance when comprehending locations in signing/gesture space. In the acceptability rating task of Experiment 1B, similar spatial locations were not grouped together as equally good examples of a sign/gesture description, again indicating an analogue, rather than a categorical interpretation, of signing space. Finally, Experiment 1C showed that ASL signers who were naive to a contrast set of 30 locations produced descriptive classifier constructions that preserved nearly all relative locations.

It appears that both signers and speakers use signing or gesture space to depict the relative location of a figure object with respect to a ground object. Singleton et al. (1993) found that hearing speakers used space to indicate locative information using gesture (without speech) in a manner that was identical to ASL signers. Furthermore, gestures that accompany speech can also be placed in space to depict the spatial relation between two objects, e.g., a cat on a wire or in a drainpipe (McNeill, 1992). However, for signers, there are linguistic constraints on where and how the hands may be positioned in space to express spatial relations. Specifically, the choice of handshape constrains how locative information can be expressed within signing space. For example, certain ASL classifier handshapes do not permit other classifier handshapes to be located on them (Liddell & Johnson, 1987), and spatial scale and perspective are also affected by classifier handshape choice (Supalla, 1982). Interestingly, for spoken languages, the type of verb system appears to affect the nature of the gestures that accompany speech. For example, speakers of verb-framed languages, such as Turkish, tend to produce gestures that primarily indicate movement path, whereas speakers of satellite-framed languages, like English, tend to produce gestures that combine manner and path movement (Özyürek & Kita, 1999).

The results of Experiments 1A and 1C suggested that signers interpret locations in signing space with respect to nonlinguistic spatial category boundaries, rather than with respect to linguistic categories. That is, signing space is susceptible to the same spatial category effects that are observed for nonlinguistic space. Specifically, signers (and nonsigners) tended to reproduce

locations away from the central vertical axis, hypothesized to be a spatial category boundary, and toward the diagonal quadrants, hypothesized to be nonlinguistic spatial categories (Crawford et al., 2000). However, effects of linguistic knowledge were observed in the tendency of ASL signers to displace the location of the figure object toward the ground object, compared to hearing nonsigners. This pattern may reflect that fact that signers treated the stimuli as linguistic constructions involving two hands. In addition, some ASL participants interpreted the descriptions of dot locations from the signer's perspective, whereas none of the hearing participants did. Thus, although locations in signing and nonsigning space may be susceptible to the same spatial category effects, locative classifier constructions are treated as linguistic expressions by ASL signers.

The results of Experiment 2A with classifier handshapes also provide insight into the relation between gesture and signing. When presented with gradient variants of an F-handshape or of a baby C-handshape in random order, hearing nonsigners interpreted these handshapes randomly—there was no correlation between handshape size and medallion size. In contrast, ASL signers knew the meanings of each handshape and selected medallion sizes accordingly. Furthermore, the signers were also sensitive to the gradient variations in handshape size. We hypothesize that within a contrast set, signers know that handshape size can be manipulated to indicate gradient variations in size. This gradient variation may be thought of as a gestural overlay on a morphemic representation. As noted, the analogy may be to English speakers using variations in vowel length to indicate gradations in duration or length.

However, when signers were naive to the contrast set of medallion sizes, they did not produce classifier handshapes that reflected a continuous gradation of size (Experiment 2C). Unlike the results with spatial location, a second group of Deaf ASL signers was unable to correctly determine the target stimuli. Furthermore, the results of Experiment 2B indicated that ASL signers grouped together several medallion sizes as appropriate for a given classifier handshape, again indicating that the F- and baby C-classifier handshapes are distinct morphemic representations and not analogue depictions of size.

Overall, these experiments indicate that some aspects of classifier constructions are clearly categorical morphemes, specifically classifier handshapes that specify size (and shape), but other components, specifically locations within signing space, are gradient and analogue representations. Thus, spatial language in signed languages (or at least in ASL) differs dramatically from spoken languages because for the latter, spatial information is conveyed categorically by a small set of closed-class forms, such as prepositions and locative affixes (Talmy, 2000). Spoken languages do not have a way of phonologically altering a preposition or affix to mean 'upward and to the left' vs. 'upward and slightly to the left' vs 'upward and to the far left'. In ASL, such spatial information is depicted by where the hands are placed in signing space, and this use of space is a gestural, rather than morphemic. This is not to say that there are no linguistic constraints on where or how the hands are positioned in signing space. However, the gradient and analogue descriptions of spatial locations that can be produced by signers stand in stark contrast to the categorical nature of spatial descriptions produced by speakers (see also Talmy, chap. 8, this volume).

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ENDNOTES

[1]For example, INDEXpl WINDOW instrument classifier: OPEN-WINDOW[exhaustive], is interpreted as 'They opened each of the windows', not '*Each of them opened the window' (Brentari & Benedicto, 1999).

[2]I thank Herb Clark for bringing this work to my attention.

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Commentary

11

Revisiting Visual Analogy in ASL Classifier Predicates

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In the 1970s, American Sign Language (ASL) research had made significant progress in demonstrating that ASL is not a nonlinguistic system of gesture but a language built on universal grammatical principles shared by all human languages. The signs of ASL had been shown to be composed of the equivalents of phonemes (Stokoe, 1960, Stokoe, Casterline, & Croneberg, 1965), the signs themselves were shown to not be completely iconic (Klima, Bellugi et al., 1979), and to have evolved in consistent ways over time (Frishberg, 1975, Woodward, 1974, 1976). However, classifier predicates remained a challenge. They were the most highly iconic signs, whose forms (handshapes, locations, and movements) appeared to vary with the continuous variation in the world event that they represented. To ask a native signer the meaning of a slight variation in a verb of motion, for example swerving a car to avoid potholes, the signer could only say that the sign zigzagged to depict that motion in the actual event. And yet a hallmark of human languages is that they represent real world events using discrete rather than continuous forms. Do classifier predicates mark the point where ASL diverges from other human languages, and lapses into the all-too-available gestural capacity of the visual medium to communicate these spatial events?

In this chapter I revisit the issue of classifier predicates, as they pose a significant challenge to the investigator attempting to discriminate analogical representation from discreteness and combinatoriality in sign language. I review my own early approach to investigating classifier predicate constructions, including some description of the evolution of my own understanding of these issues. I also attempt to break the study of classifier predicates from a single object of study into a variety of issues: "grammatical" versus "ungrammatical" uses, by a variety of populations (native vs. nonnative signers, children vs. adults), for a variety of pragmatic purposes. Each of these different situations offers a valuable perspective and a greater understanding of whether these forms are formed from discrete components or whether they represent their referents analogically.

In my dissertation and subsequent work (Supalla, 1978, 1982, 1986, 1990), I studied one subclass of classifier predicates, ASL verbs of motion and location, in order to confront the issue of visual analogy in sign language. I concluded that they conform to the same grammatical constraints found in other languages: they are composed of discrete morphemes, which recombine and have constraints on order of combination, number of morphemes, etc., similar to spoken language classifiers. However, the visual–analogic properties of these verbs are being questioned again in the current sign language research community. I would like to revisit details of the methodology and findings of these earlier studies and bring this information to the current debate, as I believe that similar kinds of methodology are required for addressing these new and old controversies.

A significant challenge in research on verbs of motion concerns how to collect data that can determine whether one view of their structure is empirically more accurate than another. In 1977, DeMatteo suggested that verbs of motion in ASL were depictions of events of motion, varying continuously as did their referent events. More recently, Liddell (chap. 9, this volume) and others have presented a similar view of motion and location in such verbs. In contrast, Cogill (2000) suggested that ASL and nonlinguistic gesture are similar in the opposite way, that is, both display discrete or schematic forms. Unfortunately, discussions of these views sometimes hinge on whether constructions look analogue, numerous, or schematic to the investigator. A crucial question concerns how to collect empirical data that can address and distinguish these views more convincingly. This problem is not resolved by asking native signers whether forms can vary. It is part of the culture of the American deaf community that deaf people's folk etymology relies heavily on explanations of the iconic roots of signs and parts of signs. Asking a signer why one verb of motion with an upward trajectory uses a straight path while another uses a curvy path will generally result in an explanation about the event pictured.

In my dissertation on verbs of motion and location, I used my linguistic intuitions about these verbs and performed a linguistic analysis using the usual methods of contrastive forms. But I also needed to confirm both the forms and the analysis with data from other signers. I created brief animated film clips, "vignettes" of different toy objects moving through space. Subjects viewed these stimuli, and after each one produced a sentence describing what they observed.

In order to verify the regularity claimed in my linguistic analysis, I asked whether native signers would produce the same linguistic forms regularly and consistently, even when the referent event varied in its details. The animated, filmed vignettes each showed an object moving along a certain trajectory path, or moving in relation to a stationary prop, such as a toy cow jumping over a fence or a toy bird swooping upside down. The objects in motion, their trajectories, and placements relative to other objects were manipulated, frame by frame, to elicit variants of a specific verb, with particular handshapes, movements, and locations. For example, to analyze the subjects' selection of verbal classifier handshapes to represent the items involved in the event, I carefully selected a range of props that should elicit a particular handshape. Each prop was used only once in the test paradigm, so that I could interpret the repeated use of the same handshape for different props, by a single subject or across subjects, as evidence for one form representing a class of noun referents. Similarly, I produced a range of motion paths and motion manners, in order to be able to see whether subjects would use the same path or the same manner across a class of referent motions. Finally, over the length of the test, paths and manners were each produced by a variety of objects, so that I could see whether the forms for motions and those for objects combined orthogonally.

At the same time, Elissa Newport and I, along with graduate student Carol Schwartz, (Schwartz, 1979), designed a different type of study to ask whether signers used handshapes to

represent a class of objects, or whether they varied their handshapes continuously and analogically to represent an object's properties. In this study, we showed a group of signers a varying set of objects (e.g., dots of varying sizes), and then asked the signers to describe the objects. The target objects were mixed with fillers with other characteristics to avoid forcing the signers to distinguish fine gradations of size if they would not ordinarily do so. (As in spoken languages, of course, it is always possible to describe fine gradations, by special or periphrastic constructions. Our question, however, was directed to ordinary ASL constructions, particularly those involving single signs.) These productions were then filmed and shown subsequently to another group of subjects, whose job was to identify from an array of dots the precise one the signer had been describing. If signs varied analogically, we reasoned, then the observer's choices should show a correlation with the dot size actually seen by the signer. We found, however, that only categories of size were encoded by the signers; within a category, the observers' choices were at chance. This result shows that these dimensions of handshape are apparently not encoding continuous or analogic variation, but only categories (see Emmorey & Herzig, chap. 10, this volume, for a recent use of this same procedure, with similar results).

The same result appeared in subjects' responses to my vignettes. Given different motions across a movement or manner category, subjects produced the same path or manner in their signing. Locative relations between the moving object and the stationary object were also limited and categorical. My linguistic analysis suggested that the ASL system of locative relations observes a "base grid," in which secondary objects can only be marked at a few contrasting points along the path of the moving object (e.g., at its origin, its midpoint, or its endpoint). Although vignette events had more continuous variation in the placement of secondary objects, signers produced only a few significant contrasts. Similarly, given different props across a semantic or size category, subjects produced the same handshape repeatedly.

I also found that the handshapes the subjects used to represent the different props had several different types of semantic and phonological properties. Some handshapes (which we later called SASS classifiers), were composed of components that were used in other handshapes. For example, the size-and-shape classifiers G, H, and flat-hand shape are three distinct classifiers that represent relatively flat objects of varying widths. (Note that ASL does not allow the addition of a third finger to represent widths intermediate between narrow and wide—it uses only these three classifiers to represent all possible widths. Other sign languages may use only two such classifiers: narrow and wide.) They share flat shape (straight fingers) with one another, but vary in the width of the object (marked by number of fingers—one, two, or four). A related set of SASS classifiers, with baby C-, hC-, and C-handshapes, represent cylindrical objects of the same widths (again, marked by number of fingers—one, two, or four). In short, then, these size-and-shape classifiers represent classes of objects based on their physical dimensions, but are composed of internal morphemes of form (e.g., straight vs. curved, and narrow vs. medium vs. wide). These classifiers also share a set of constraints on how they may combine with certain movement and orientation features. In contrast, other handshapes, like the "vehicle classifier" (thumb, forefinger and second finger extended), are used to represent more abstract classes. These semantic classifiers have more frozen handshapes; the subparts of the handshape cannot be altered to represent variations in the object, such as a car with a broken door, and they cannot be analyzed into subcomponent morphemes. Furthermore, they have a different set of constraints than do SASS on the movement and locative morphemes with which they can combine. I interpreted these phonological and semantic differences as evidence for two different types of classifiers, called SASS classifiers and semantic classifiers.

Creating the vignettes as elicitation stimuli allowed me to constrain and focus the types of objects and motions under study. Real-world events have so many attendant and varying aspects, subjects could choose to describe them in a great variety of ways, and this variety could be quite separate from whether there was consistent grammatical structure for verbs of motion in the language. Even in this study, I created some events with too many details. For example, I filmed a doll that walked by moving her legs in a lifelike manner and swaying the body. I found that subjects responded using a variety of descriptions, focusing on different aspects of the event. Some subjects would respond with verbs that used the whole body (body classifiers) to represent the manner of walking, whereas others would use a handshape classifier that represented the doll's body along with path and manner morphemes; and some would use both kinds of verbs, in sequence. These responses showed me that verbs of motion are composed of two different types: verbs that used classifier handshapes for the nouns involved and could combine these with manner and path or location morphemes, versus verbs that used body classifiers and marked the body motions involved (but not the path). The responses to the highly detailed stimuli also provided evidence that signers could not encode all these aspects of an event by adding an unlimited number of morphemes to a single verb. Rather, verbs of motion are constrained as to the number and type of morphemes they could accept. If more details must be expressed, they must be encoded in a second verb, with different types of verbs able to carry different types of morphemes. This is how I discovered serial verbs (Supalla, 1990).

A goal of my dissertation was also to use these filmed vignettes to study several native signing deaf children, to see whether their responses would deviate from or omit any of the morphemes used in adult native signer's responses. For this study, I created 120 vignettes (later reduced to 80 vignettes as part of a larger battery of tests of ASL grammar), which I designed to elicit only a single verb, in order to focus on complex movements, locative relations, and types of classifiers. The analysis of the children's correct selection, omission, or replacement of handshape, movement, and location morphemes demonstrated that different parts of the classificatory morphology are acquired independently, which provided evidence of the psychological reality of discreteness and componentiality in classifier predicate constructions, particularly in the verbs of motion and location.

Another advantage of this methodology is that it allows repeating the same procedure with different individuals with the context information under full control. We could therefore guarantee that each subject would be asked for the same propositions because the same vignettes were presented to all subjects. Eventually Elissa Newport and I realized the potential of this test paradigm for comparing competencies across signers of different ages and backgrounds, which led to the development of a full test battery testing a variety of grammatical structures in ASL (Newport, 1990: Newport & Supalla, 1980).

Linguistic Innovation—Verbs of Motion and Location

This method showed that across varying events of motion and location, adult native signers use a limited set of discrete morphemes that recombine to form verbs of motion and location. But it also allowed us to study different populations of individuals, some of whose responses deviated from the performance of adult native signers. In this section, I describe these other populations and situations where I initially thought one could find signers using analogical, gestural expression.

Adult native signers responses to the test stimuli were completely systematic; in fact, I based my definition of full grammatical competence in the morphology of these verbs on adult native signers' consistent, patterned responses. I consider the adult native signers' responses using these classifier predicates to be *systematic (or grammatical) innovations*, because the informant may never have produced that particular combination of morphemes before. In fact I designed many of the stimuli as unusual events (e.g., a loop moving over the top of a tree) in order to elicit a novel combination. By their nature, polysynthetic morphological systems allow novel combinations of morphemes (innovations) that are completely grammatical.

In contrast, young native children's responses to the same stimuli did not always conform to the grammatical targets found in native adult signers. Were they using nonlinguistic gesture in the place of language? Interestingly, even these "erroneous" responses revealed a set of discrete forms. For young children, many of the morphemes required in the adult verb were omitted. One type of error involved the replacement of a single morpheme, the classifier, with a handshape from a relevant ASL noun sign. This is also sometimes done by adult second language learners of ASL. In contrast, older children (approximately 6 years old) would sometimes use handshapes that were modifications of the target classifiers. These modified handshapes were the result of recombinations and resynthesis of the features or parts that comprise these classifiers. One might, at first consideration, call these unsystematic innovations on the part of the children, because they do not conform to the adult grammar. On the other hand, the handshapes may be fully systematic with respect to the child's developing linguistic competence. The children's ungrammatical predicate classifiers were still composed of discrete morphemes, and the replacements were constrained to handshapes borrowed or derived from other parts of the language, not idiosyncratic or analogic forms.

There do exist situations where adult native signers use classifier predicates that violate the grammatical morphology of these verbs: when they are making a joke, playing on words, or for artistic effect. Perhaps, I thought, this is where we will find signers leaving behind the basic constraints of the language, and taking up the mantle of gestural representation. In 1980 I presented an analysis of Eric Malzkuhn's translation of Lewis Carroll's *Jabberwocky* poem, where I showed that he created "nonsense" signs by playing with the morphological system in a discrete and compontential fashion (Supalla, 1980). The result, like the English original, was a signed poem about unfamiliar beasts living in a fantasy world. Although his signs were unsystematic innovations, they were still created using the components found elsewhere in ASL. They also still conformed to the same constraints on phonological formation and syntactic agreement used in grammatical ASL. I found that Malzkuhn had merely replaced conventional classifiers with novel hand and body articulators. Otherwise, his ASL was highly systematic and grammatical. Padden and Humphries (1988, chap.5) and Wilbur (1987, pp. 32–34) describe further how systematic modifications to the phonemes and morphemes of ASL have been used to create a variety of signing artistic expressions.

It is clear that the morphology of verbs of motion offers rich possibilities for *linguistic innovation*. More importantly, the creation of novel classifier predicates for artistic effect is not idiosyncratic; instead, the artist provides powerful evidence for the existence of a morphological system by systematically manipulating and violating it. All these cases show that a model of the grammar of verbs of location and motion can account for both grammatical and ungrammatical innovation.

There is another setting I have considered in which I thought adult native signers might revert to gesture: in communicating with signers of mutually incomprehensible foreign sign lan-

guages. For this, I examined the lectures of two native signers of two different sign languages. The lectures were delivered in International Sign (IS), at an international conference for deaf researchers (Supalla & Webb, 1995). IS is especially interesting as a *lingua franca* because it lacks of a standardized lexicon, which forces signers to innovate new ways to represent concrete and abstract referents. Although the lecturers were experienced users of IS, I thought the setting might force the lecturers to revert to pantomime or gesture, to communicate abstract concepts to their audience from a variety of different sign language backgrounds, even though using IS with a single interlocutor with a single native sign language might be more systematic. Yet even in this communication situation, where the lecturer and audience do not share a single grammar, I found that the signs and sentences of IS were structured in much the same way as in sign languages: composed of discrete components.

It seems that native signers find it very hard to completely abandon the linguistic constraints of their language. As an aside, when I supervised a dissertation on the topic of the gesture used by hearing people, hearing lab members pointed out that my attempts to reproduce these gestures did not appear natural, the way hearing people made them. Could it be that a signer cannot completely abandon the phonology of his native language, and imports a language "accent" even when imitating the gestures of hearing people? This fascinating question remains open.

HANDLING AND BODY CLASSIFIERS

To this point I focused on a subset of classifier predicates: verbs of motion and location. However there is another type of classifier predicate where classification is based on kinesthetic properties rather than shape or abstract classification. I consider these predicate classifiers to include two subtypes. One type is *handling classifiers*, which represent an object with a handshape that resembles the hands holding or manipulating the object. Years ago, while reading the literature on classifiers in spoken languages, I found a paper that presented pictures of a person holding different quantities of various objects, such as a person holding bundles of sticks of different sizes, to illustrate the classifiers used in that language. I realized then that ASL also has a limited number of discrete morphemes to refer to quantities of different substances; for example, classifier morphemes for quantities of stick-like objects are based on how they are grasped: the pinching F handshape, the handling classifier for a single stick; the C-handshape for a small bundle; the two-handed C-handshape, palms facing each other, for a middle-sized bundle; and the two arms extended in front, with hands overlapping, for large bundles. In Supalla (1986), I presented a paradigm of different handling classifiers of this type. Although the gestural modality permits an iconic representation of these handling classifiers in a way that the acoustic medium does not, ASL nonetheless does not allow continuously varying gestures to encode small increments in size. Although the form of the classifiers within or across individuals can vary slightly, ASL only has four classifiers, for single, small, medium and large bundles of stick-like objects.

The second type of kinesthetic classifier is *body classifiers*, which are articulated by the signer's upper body in a posture that in some way resembles the referent, such as a posture representing a person holding and swinging a baseball bat; a person walking in a relaxed manner, or the body of an animal. I have not yet been able to identify a limited set of discrete components of the upper body articulations that are used in these signs. But this does not mean there is no such discrete system. From my previous results my best guess is that my analysis is simply not yet correct or complete.

One impediment to my investigation of whether body classifiers are limited in number and form has been that traditional ASL transcription systems (e.g. Stokoe, 1960, Stokoe et.al., 1965) do not recognize the body as an active articulator, only as a set of locations. However, Kegl and Wilbur's (1976) work on projected body pronouns has offered a first linguistic account of the body as an articulator involved in body shifting for *point of view*.

Another approach I considered was informed by the *prototype model of categorization* (Rosch, 1973), which claimed that people share basic-level concepts about the actions and postures used to manipulate various objects in the world. For example, most people share a general concept or a schema for eating pizza that involves holding a triangular shaped piece, cut from a round pie, and taking a first bite from the pointed end (Lakoff, 1987). Lakoff's descriptions suggested to me that signs could be based on these schemas, and could therefore be categorized as well. I analyzed the postural representations for different animals into a limb classifier, where the hands represent the animals limbs, with specific handshapes for claws, paws, hoofs, feet, or fins; and size and shape classifiers that represent facial/head features, such as shape of antlers, horns, ears, mouth, nose, and eyes. This analysis reveals that there are contrasts based on a single component of body posture. For example, the postural representation for a rabbit and a puppy are identical except for one component, the mouth. Both involve the limb classifier for paws, but puppy has an open, panting mouth, whereas rabbit has a toothy mouth.

This analysis was incomplete and did not fully account for these kinesthetic representations using the upper body, and I have not pursued it further. However, as mentioned earlier, in Supalla (1990) I found evidence that serial verbs of motion are systematically composed of a body classifier, identifying the animate noun, followed by a second verb of motion or location, incorporating a classifier and morphemes for path and manner or location. In that analysis, I found contrasting body classifier components across different verbs of manner (e.g., a body classifier for a human flying—the Superman pose; a rabbit hopping by; a man limping). Further work is needed to identify a full set of body postural classifiers, and to investigate whether they can be fully analyzed into contrasting features.

CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

In this chapter I presented different aspects of classifier predicates that I have considered over the years in evaluating whether they are linguistic—that is, discrete and componential forms—or analogical and nonlinguistic. At each step of the way, I have failed to find evidence of purely analogical, iconic representations in ASL, either in the handshapes or the movements and manners used in these verbs. This is surprising, given the apparent ability of the gestural medium to iconically encode continuous variation in real world objects and events. However, further research on this question is needed. One important topic for future research concerns the syntax of classifier constructions. Most of the research on verbs of motion thus far has focused on the structure of individual verbs. I believe this research has been valuable in clarifying the morphophonemic components of these verbs as a class, and the dimensions along which they differ from other types of verbs in ASL. However, although we know that these verbs are used in particular types of syntactic constructions (with nouns set up in space first, followed by one or several classifier verbs expressing the motions and spatial locations of these objects with respect to one another), virtually no linguistic research has focused on the details of this syntax and the morphosyntax involved in marking the verbs in relation to the rest of the sentence. Why is this important? Liddell (2000) has raised questions about how many positions in space are signifi-

cant in ASL points, agreement verbs, and verbs of motion, and whether there is a limit on the number of spatial locations such constructions utilize. In my opinion one important consideration in addressing this question is not the superficial number of locations that can be used at different times (this is like counting the number of different acoustic tokens in a spoken language), but rather the relations (or agreements) between one element in the sentence and another. Many of the morphemes of verbs of motion are agreement morphemes: agreeing in spatial location or in classification with other elements of the sentence. To analyze them correctly, then, one needs to examine how these agreement features are marked and distributed over the sentence, and even over several sentences within a discourse passage. My expectation is that this type of analysis will show that ASL, like other languages, critically relies on contrasting a few categories and relations in space, not on maintaining and contrasting large numbers of precise individual points. But a definitive answer to this question requires analyses that have not been performed.

A second important topic for future research, and the topic on which my own current research focuses, concerns pursuing the relations between nonlinguistic gesture and sign languages, particularly as young sign languages form. My discussion above has sometimes presupposed that nonlinguistic gesture is, in fact, continuous and analogical, quite unlike the categorical and discrete nature of language. But this also is not well studied, and much recent research on nonlinguistic gesture suggests that it too may have more discrete and even componential structure than we have recognized. For example, Webb's (1996) dissertation, on gestures used by hearing individuals while speaking, shows that hearing people may have a limited and shared lexicon of metaphoric gestures, and that some of these gestures may contain and contrast gestural subcomponents that become full morphemes in sign languages. Work from Goldin-Meadow (personal communication) and Dufour (1992), on gesticulation by hearing subjects asked to gesture in the lab without speaking, shows that many devices utilized in systematic ways by full sign languages can appear (though typically not entirely systematically or consistently) in this type of gesturing. Finally, our own work on Amami Island (Osugi, Supalla, & Webb, 1999) shows both the similarities and differences of gesture structure for hearing individuals who do not use gesture as their language and hearing and deaf individuals who do. Ongoing work on Amami Island and on historical change in ASL (Supalla, in press) will, I hope, provide further insight into the features of nonlinguistic gesture that are borrowed and exploited for a developing sign language, and the changes involved in grammaticalizing these features as they are used in a mature language. In these situations, we hope to see more precisely how constraints of human cognition and learning may direct the evolution of a gestural communication system into a full linguistic system.

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12

Gesture in Language: Issues for Sign Language Research

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Hearing people gesticulate when they speak (Kendon, 1972, 1980, 2000; McNeill, 1985, 1992, 2000). This is universally true. The culture has not been found whose hearing members do not spontaneously produce meaningful manual, bodily, and facial movements when speaking with one another.[1] Since the 1960s and 1970s, results of close analyses of co-occurring verbal and nonverbal behaviors in audio-videotaped natural spoken language have suggested that these behaviors are "two aspects of the process of utterance" (Kendon, 1980, p. 207). Research on sign language during the same interval of decades (Baker & Cokely, 1980; Klima & Bellugi, 1979; Liddell, 1980; Newport & Meier, 1986; Padden & Perlmutter, 1987; Stokoe, 1960; Stokoe, Casterline, & Cronenberg, 1965) has succeeded in demonstrating that language in the manual–visual modality shares with spoken language all of the dimensions of patterning necessary to qualify as, "a humanly possible language, [having] universal design features in common with all human languages" (Supalla, 1982, p. 9). Because it appears that gesturing is a natural and ubiquitous part of language production for hearing speakers, it is reasonable to ask whether deaf signers—somehow analogously—also gesture while signing. Here we consider some ways one may ask this question.

Aspects of classifier constructions, for instance, have been identified as potentially "mimetic" in character (Klima & Bellugi, 1979). A signer may deploy a VEHICLE classifier handshape in such a way that the signed utterance iconically depicts aspects of the motion of the vehicle in some witnessed event. The classifier handshape may "trace" the path of motion of the vehicle. This can involve changes in speed and direction in ways not circumscribed by the grammar of sign language. The hand moves in such a way as to get across the gist of the motion. The aspects of the production that are grammaticized are the classifier handshape and the fact that the path is traced by the hand.[2] The rest may be pure analog depiction, in that exactly how the motion

is depicted is variable. Its features can flow directly from the signer's visuospatial conception of the event, likely influenced as well by the requirements of the immediate sign discourse context. Schick (1990) and Engberg-Pedersen (1993) proposed a category of movement within classifier constructions that is in line with the above description.[3] Engberg-Pedersen (1993 notes that some verbs, "include movements that are best described as analogues of specific motions" (p. 261). Such use of a sign classifier together with a grammatically unconstrained expression of motion suggests a possible locus of one sort of gestural patterning in sign language. It is important to note, however, that many (if not most) sign language linguists hold that movement within classifier predicates is discrete and morphemic in character (Supalla, chap. 11, this volume).

We consider how a sign language utterance may simultaneously incorporate both morphemic and gestural characteristics and consider whether sign language may also manifest other types of gestural patterning as well. How we carry out such an inquiry depends on how we define *gesture*, even *language* itself. Defining gesture with respect to sign language can be especially problematic.[4] A place to begin is by identifying properties of gesture in spoken language. These can serve as heuristics in an attempt to identify a gestural dimension of sign language.

GESTURE IN SPOKEN LANGUAGE

The intent is to focus on gestures that share a semantic and discourse-structural relationship to the utterances with which they co-occur.[5] McNeill (1985, 1992) claimed that many such gestures are manifestations of a mode of meaning-creation fundamentally different from one that draws on the systems of conventionalized categorial oppositions that define, for instance, a language's phonemes and morphemes. An example of such gesturing is the bodily movements of a speaker who, in synchrony with saying, "The cat squeezes into the drainpipe," presses her arms tight to her sides, causing her body to occupy a smaller space. In an identical speech context, another speaker moves his right hand, fingers and thumb extended with their tips bunched together, through a semicircular shape created by the curved thumb and fingers of the left hand. Close analysis of the relationships between hearing speakers' gestures and speech reveals a tight temporal synchrony between this sort of gesture and the spoken phrases with which they share meaning. There is another variety of speech-associated gesturing as well, that shows somewhat less of a tendency to be strictly speech-synchronous. Speakers frequently produce gestures to time with spoken deictic indexicals or with brief pauses in the flow of speech, in a way that suggests the intention is to draw the listener's attention to the gestural display. An example is when a speaker says, "The guy went like this," followed by a demonstration of some action performed by the person under discussion. Intervals of gesturing may thus also be interspersed with intervals of speaking in this way.

The frequency, size, representational qualities, and complexity of speech-associated gestures can vary tremendously across individuals and within an individual across contexts of speaking; however, gesturing of some sort generally does occur more or less continuously in contexts of unrehearsed speaking, unless the behavior is suppressed for some reason. The ubiquity of speech-associated gesturing across cultures and languages leads researchers who focus on this dimension of human linguistic behavior to two conclusions: (1) Gesturing is somehow an integral part of the natural language production process, and (2) it is a linguistic universal. Gesture is part of human language.

The domain of gestural phenomena is heterogenous. This is true even when we consider only gesturing in spoken language. We have already touched on several properties that may be con-

sidered definitional of a significant portion of speech-associated gesturing. McNeill (1992, 2000) listed the properties that differentiate spontaneously generated gestures as a mode of meaning creation from the conventionalized signs of speech and sign language. He describes gestural meaning creation as "global and synthetic" to contrast it with "combinatoric, linear-segmented" speech and sign language. He notes further that spontaneous gesture is "context-sensitive. Individuals create their own gesture symbols for the same event, each incorporating a core meaning but adding details that seem salient, and these are different from speaker to speaker" (McNeill, 1992, pp. 41–42). Those aspects of gesture that are spontaneously generated at the moment of speaking lack standards of form and lack a community of users such as those possessed by context-independent and listable forms of speech and sign language.

Kendon's work of recent years on gestures of Neapolitan Italian speakers highlights another dimension of bodily gesture. This is gesture with the properties of being socially constituted, conventionalized, and produced in accord with category-specific standards of form (Kendon 1992, 1994, 1995, 2000). Kendon (1992) referred to these as "quotable" gestures, some types of which are alternatively referred to as "emblems" (Ekman & Friesen, 1969; McNeill, 1985, 1992). Such gestures are in certain essential respects like the signs of speech or sign language. It is reasonable to think of them as morphemic. Despite the fact that, for many people, some of the more obvious exemplars of this emblem category, such as the *OK-sign* and the *thumbs-up*, are prototypic members of the category *gesture*, here we think of them instead as being more like signs. This type or dimension of gesture is not a focus here.[6] However, it is important to keep in mind that morphemic or context-independent forms of gesture are routinely co-produced with other, spontaneously generated, dimensions of gestural performance. This possibility of sign/gesture co-production *is* a focus here. The differing dimensions of integrated gesture performances are distinguishable semiotically and may be considered separately from one another.

A particularly significant defining property of the target gestural dimension, one not given special emphasis in McNeill (1992), is that gesturing is not modality-specific. In the opening paragraph, above, gesture was identified with movements of the hands, face, and body; however, we are specifically concerned with a particular framework for the creation of meaning, rather than with a production modality. During spoken language production, a pattern of behavior is considered gestural, regardless of whether it is produced by mouth or hands, to the extent that its form derives from semiotic principles other than those that structure the categorially contrastive, socially constituted, conventionalized signs of language. The fundamental sense of gesture intended here links to linguist Dwight Bolinger's (1975) claim that "language is embedded in gesture" (p. 18). Bolinger's (1946, 1986) work dealt largely with speech and was concerned with elucidating what he considered to be spoken language's pervasive gestural aspects. The gestural aspect of spoken language with which he was primarily concerned was speech prosody, or intonation. His way of thinking about prosodic gesture was that it constitutes a source of meaning in spoken language. In his work, he catalogued many instances in which a particular intonational contour contributes as much to the interpretation of the meaning of an utterance as do the sequentially arranged morphemes and syntactic units.[7]

Bolinger (1983) also reported observations of the facial and bodily gestures that occur with speech. He noted systematic temporal alignments between them, as have subsequent researchers. Kendon (1980), Schegloff (1984), and Nobe (1996) noted that the most dynamic phase of bodily gesture tends strongly to synchronize with the element(s) of co-occurring speech that are prosodically emphasized. As concerns spoken language, an apt characterization of these observations is to say that gesture is bimodal; that is, the manual–visual and vocal–auditory modali-

ties share gestural production characteristics. They share gestural semiotic characteristics as well; for example, prosodic emphasis is gradient in character. Further, speech prosodic contouring possesses iconic representational capabilities (Okrent, in press). To see how this is so, consider a phrase such as, "It took sooo looong," in which the forms of the categorially contrastive vowel phonemes are perturbed, lengthened, in the process of generating an utterance that manifests a distinct gestural semiotic as well. Spontaneously generated onomatopoeia are another sort of vocal gesture. Certain uses of reduplication provide further examples; for instance, the number of repetitions of the verb in a phrase such as, "He climbed, climbed, climbed, climbed," would be, by hypothesis, partially under the control of a gestural impulse. We see that there are shared production (timing) and semiotic (gradience, iconicity) characteristics of gesture across the vocal–auditory and manual–visual modalities in spoken language, suggestive of a functionally unified system that underlies gestural patterning in both modalities.

Consider a final illustrative example from spoken language, involving the two semiotic modes and their interaction when they are constrained to occupy the same modality. This example involves the interaction between intonation and phonemic tone in spoken Mandarin Chinese. In Mandarin, four distinct pitch contours phonemically distinguish morphemes that are made up of identical segmental phonemes. The syllable *ma*, for instance, uttered separately with each of the pitch contours, takes on four distinct meanings in turn. These are in categorial opposition to one another. Mandarin also, like any other language, has utterance-level intonational contouring. Prosodic-gestural pitch variation performs the same functions in Mandarin as it does in other languages. Intonational contours convey affect and emphasis, for example. Okrent (in press) also found that pitch in Mandarin may be exploited to create discourse-contextualized iconic representations of, for instance, relative height—high versus low. This can be accomplished in a way that does not obliterate the phonemic tonal contrasts necessary to support comprehension. Of significance for this illustration is that prosodic pitch can work to perturb syllable-level, phonemic pitch while leaving enough of the latter intact across a section of discourse such that, with contextual support, meaning is not lost (Yang 1995). These small-scale examples involving prosodic gesture are representative of the kind of linguistic patterning that is significant in investigating possible gestural dimensions of sign language. The examples illustrate joint occupancy of a single modality by gestures and the signs of language of the kind that led Bolinger to think of gesture as everpresent and inseparable from the linguistic "code," yet semiotically distinct from it.

Highlighting the modality independent nature of the target gestural dimension puts this discussion of gesture somewhat at odds with many others. Such discussions are generally limited to gesture in the manual–visual modality. One encounters statements suggestive of the idea that everything in speech is analytic, built of categorially opposed, arbitrary, and conventionalized forms, whereas all bodily gesture is synthetic, analog-gradient, and bears a nonarbitrary relationship to contextualized meaning; however, it is important not too make to much of this generalization. Separation of the two semiotic frameworks into the two modalities—speech *versus* bodily gesture—is often merely an issue of explanatory convenience, an aid to the exposition of certain ideas. It is clear that, in spoken language, both semiotic frameworks are operative in both modalities. Bodily gesture has its signlike, socially constituted emblems along with its *de novo* iconic representational gestures. Speech has its conventionalized phonemes and morphemes, along with gestural prosody and other gradient and iconic phenomena.[8] It is equally clear that what serves as an expository convenience in discussions of the gestural dimension of spoken language loses its usefulness when the goal is to elucidate a possible gestural dimension in sign

language. In sign language, manifestations of the alternative semiotic frameworks unavoidably share a single modality.

LOOKING FOR GESTURAL PATTERNING IN SIGN LANGUAGE

The accumulated research on gestures in spoken language predicts a gestural dimension in sign language. The preceding discussion yields several possibilities for what, of a gestural nature, we might look for in sign language:

1. Signs and gestures may be co-produced in sign language utterances, such that these utterances simultaneously manifest properties of both semiotic frameworks.
2. Gesture production may be interspersed with intervals of sign production.
3. Gestures may be produced by articulators other than those engaged at the moment in the articulation of sign forms.

In the second paragraph of this chapter, we examined a sign utterance involving a VEHICLE classifier that seems a likely example illustrating the first possibility. In that utterance, the classifier handshape is a morpheme of the language. By hypothesis, the motion is under the control of a gestural impulse. Support for this hypothesis would consist of evidence of a fair amount of variability across signers in the patterning of the motion component of such a classifier construction when it occurs in discourse; also, sensitivity of the patterning of motion not only to the analog characteristics of the referent, but also to the immediate discourse context. Further claims of sign–gesture co-production are presented in Liddell (1996, 2000, chap. 9, this volume), Liddell and Metzger (1998), and Emmorey and Herzig (chap. 10, this volume). These authors describe gradiently patterned uses of signing space to reference entities and locations. Such usages occur in the context of sign utterances that simultaneously manifest linguistic-categorial standards of form and execution in their nonspatialized dimensions of patterning.

The claim that aspects of prosody or intonation in spoken language are gestural in nature opens further avenues of investigation in sign language relating to the first possibility in the list. Among the dimensions of linguistic patterning manifested in spoken language that have also been identified in sign language, prosody may be relatively underinvestigated; nevertheless, existing studies of prosody in ASL suggest similarities to spoken language. We are not directly concerned with what Nespor and Sandler (1999) referred to as the "syntax-phonology interface" (p. 145) in their study of prosody in Israeli Sign Language. Findings such as Grosjean's (1979) of phrase-final lengthening are likely pertinent to that interface. However, Nespor and Sandler (1999) alluded to other aspects of prosody, including prosodic prominence that cues discourse focus; also, intonational contouring that signals the illocutionary force of an utterance, or "paralinguistic nuances of meaning" (p. 145). Prosodic phenomena such as these lend themselves to a gestural analysis. Phonetic correlates of emphatic stress have been identified in ASL (Coulter, 1990), as have phrasal contours that peak at the location of a stressed sign (Coulter, 1992). Reilly, McIntire, and Seago (1992) describe affective prosodic patterning in ASL. All of these relate to Bolinger's (1983) notions, outlined above, concerning the gestural aspects of intonation in spoken language. The ASL research findings demonstrate, similarly to Bolinger's demonstrations, co-production of semiotically distinct gestural prosody and categorial-linguistic signing in a single modality. Future research on this gestural aspect of sign language could

follow up on Nespor and Sandler's pointers to the varieties of gestural prosodic patterning in sign language.

Linking to research on sign language prosody, the findings on gesture in spoken language provide a further useful heuristic for investigations into the possibility of simultaneous co-production of signs and gestural patterning within the manual–visual modality. In spoken language, the close temporal relationship between the peak prosodic emphasis and the occurrence of meaningful gestural movements is well documented (Kendon, 1980; Nobe, 1996; Schegloff, 1984). Representational gestures have a high probability of co-occurrence with those words or phrases to which speakers give intonational emphasis, for example, in the service of establishing contrastive discourse focus. Assuming that it is possible to identify patterning in sign language discourse that is indicative of peak prosodic emphasis, such loci are likely places for the emergence of gesturing. Okrent's (in press) work suggests that the constraint of sign-gesture co-occurrence within a single modality is no barrier to the occurrence of even iconic representational gestural patterning. Recall that the Okrent (in press) findings concerned joint gestural and (speech) sign patterning in relation to a single feature—pitch. These lines of research—on ASL prosodic emphasis, on the temporal relationship between prosodic emphasis and meaningful gesture in spoken language, and on the simultaneous occurrence of (speech) signs and iconic gesture within modality—taken together can guide a search for gesture homologs in sign language discourse. In other words, if there is such representational gesturing in sign language, the data from spoken language suggest it is likely to occur in association with prosodically emphasized sign forms; further, it may involve some subtle, gradient, deformation of certain features of those sign forms, that deformation not being significant enough to disrupt comprehension.

The second possibility listed at the beginning of this section is that signers may engage in gesturally patterned displays interspersed with intervals of signing. Emmorey (1999) provided several examples of this. Such gesturing would include mimetic demonstrations. To a gesture researcher, some of the data from Nicaraguan Sign Language (Kegl et al., 2000) are suggestive of a pattern of usage in which intervals of gesturing and signing may alternate. Kegl et al. point out that, across signers, one can observe great variety in descriptions of particular features in line drawings. For instance, Kegl et al.'s deaf informants, in the context of signing a description of a line drawing depicting a towel hanging from a clothesline, describe the feature of a small, ragged hole in the towel in a great variety of ways. The author analyzes these descriptions within the system of conventionalized linguistic contrasts of that language, characterizing the variation as being a reflection of each signer's particular focus on some aspect or other of the feature in the line drawing. Note that such a series of responses to that one feature of the line drawing, in which each informant uses a different means of description, is also suggestive of spontaneous generation of gesture forms in response to an unfamiliar or unusual stimulus. To the extent that each of the descriptions is idiosyncratic to the individual signer, and iconically depictive of features of the stimulus display, one may hypothesize that gestural patterning is involved, in accord with the properties listed earlier from McNeill (1992). A gestural interpretation would be further supported to the extent that a featural analysis yields forms lacking stable discrete existence outside the immediate eliciting situation—both across signers and within signers, across discourse situations. The intent here is not to present a counter claim; rather, to highlight some principles that would structure an alternative, gesture-oriented, hypothesis concerning the variability data Kegl et al., (2000) reports.

The third possibility listed at the beginning of this section concerns the relative ease, in research on spoken language, of analytic separation of gesture from conventionalized,

categorial-linguistic patterning. This is when it is the case that gestures occur in the manual–visual modality while patterning of the other variety occurs in speech. This relative ease of analysis makes it desirable to search for instances in sign language production when the manifestations of the different semiotic frameworks are similarly separated in some way. Gesturing and signing may emerge simultaneously, perhaps, but in different bodily articulators. We may expect to see instances in which the manual articulators are signing at the same time that the nonmanual ones are engaged in a gesturally patterned display. Facial expressions of affect, varying in degree, are attested to co-occur with manual signing. We would claim that these are gestural. It also seems possible that gestures of the mimetic depiction variety, executed by parts of the body other than the hands, could occur during intervals of manual signing. Emmorey (1999) cited an example of this: a signer whose body sways while the hands are producing the sign for DANCE. Wendy Sandler (personal communication, July 2000) suggests that gestures may occur in a signer's nondominant hand, while signs are being performed by the dominant hand.

CONCLUSIONS

Research on spoken languages leads to the conclusion that gesture is an integral part of human language. Hearing speakers gesture iconically, metaphorically, and rhythmically in accord with the prosodic structure of their languages, and use gesture space cohesively to "map" the relations among the referents that figure in their discourses. Such gesturing is abundant, ubiquitous, and universal across cultures and languages. A gestural dimension of patterning is therefore predicted to exist in signed languages as well. The history of sign language research of the last several decades is one of successful demonstrations of how many of the phenomena of sign language line up point for point with like phenomena in spoken language. Existing sign language research is suggestive of gradient-gestural patterning in regard to signers' use of signing space. It also appears that there are dimensions of sign language prosody that pattern gradiently, in a gestural fashion, as is true of spoken language prosody. Further research will likely expand as well our sense of the possibilities for iconic representational gesture in sign language. We expect it will be found that iconic gestural patterning can share the stage—that is, the hands, even the moment of occurrence—with conventionalized, categorially patterned sign forms, in a variety of ways that may only be determined by further, close, analysis of naturalistic sign discourse. From the perspective of research on the gestural dimension of spoken language we can say that, should it emerge that sign language is in fact devoid of a gestural dimension of patterning, this would constitute evidence of a fundamental and significant difference between languages in the two modalities.

ENDNOTES

[1]The collected papers in McNeill (2000) provide a point of entry into the literature on cross-language comparative research on gesture in spoken language.

[2]I owe this description to Carol Neidle (personal communication, October 1997).

[3]I thank Karen Emmorey for calling my attention to these authors' analyses concerning this issue.

[4]There is the further problem of the accumulated weight—over the history of thinking and research on signed languages, the deaf, and Deaf culture—of pejorative connotations of the word *gesture*. We set this issue aside, except to note that there is a world of difference between the view of a behavior trivialized as "just gesture"—that is, somehow beneath consideration within research on human linguistic function-

ing—and the view of the behavior as a mode of cognition and of semiosis that is a core property of that linguistic functioning, as much in need of an account as, for instance, phonological or syntactic patterning.

[5]This discussion is therefore not concerned, for instance, with gestures that a police officer would use to direct traffic, the pantomimes performed in a game of charades, nor the facial expressions and hand signals a worker would use to pass information to another worker in a noisy factory. Among hearing speakers, such gestures function to take the place of speech when circumstances prohibit the ordinary use of spoken language.

[6]Neither will we be directly concerned with the sense of "speech [and sign] as gesture" as advanced by Haskins Laboratories researchers Studdert-Kennedy (1987) and Browman & Goldstein (1985); what Studdert-Kennedy described as, "subtly interweaved patterns of movements, coordinated across the articulators" (cited in Armstrong, Stokoe, & Wilcox, 1995, p. 8). The sense of gesture these authors are concerned to articulate is orthogonal to, though not incompatible with, the sense of gesture relevant to this discussion. One way to think of the distinction is that here we are concerned with a more macrolevel of gestural patterning, where a bundle of features taken together achieves a certain meaning within a connected discourse context.

[7] Note that the instances Bolinger catalogued include many where speech is embedded in "melodic lines" that have the properties of social constitution, conventionalized meanings, and of being produced in accord with category specific standards of form. For example, the contrast in American English prosody that distinguishes declaratives from interrogatives is a conventionalized one. Such contrasts have been identified as lying within the domain of "syntactic prosody," in contrast to, for instance, affective–emotional prosody (Luks, Nussbaum, & Levy, 1998). Bolinger may not have made much of a theoretical distinction between the sort of speech prosodic contours that participate in a framework of conventionalized, categorial oppositions and those that do not; here, of course, we do. Given Bolinger's careful descriptions of the prosodic phenomena he studied, it seems straightforward to distinguish those instances from his work that are germane to the argument we are building here from those that are not.

[8]Of more significance in this regard is the probability that the manual–visual modality promotes more elaborated gestural representation than does the vocal–auditory modality, by virtue of the greater potential the former offers for iconic representation, spatial metaphor, and deixis. However, this is an issue of the degree of representational capability available to be exploited by gestural semiosis in each modality, not a distinction between the two in terms of which modality supports gestural semiosis and which does not.

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IV

The Acquisition of Classifier Constructions

13

A Cognitive/Functional Perspective on the Acquisition of "Classifiers"

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> One of the most notable aspects of the grammar of ASL is the productivity of multimorphemic classifier predicates.
>
> —Brenda Schick (1990, p. 358)

> Sign language makes use of dimensions of the spatial mode, which spoken languages lack, in creating visible shapes moving in space which reveal their mimetic origins yet are systematically and formationally constrained.
>
> —Edward Klima & Ursula Bellugi (1979, p. 66)

Our research deals with the acquisition of two sign languages, American Sign Language (ASL) and Sign Language of the Netherlands (SLN). We have preschool-age data on the initial acquisition of each language by deaf children with either deaf or hearing parents, along with

data on the child-directed signing of the parents, as well as school-age data on ASL. The data include videotapes of naturalistic interaction in homes and preschools, and a variety of structured tasks in homes and schools. The first challenge we faced, in 1998, was to devise a transcription system that would capture the full array of simultaneous and successive meaning components in sign languages—that is, a representation of signed utterances that is neither phonological nor based primarily on spoken-language glosses. The result was the Berkeley Transcription System (BTS), now available for application and evaluation across sign languages.[1] Work on BTS led us to reexamine linguistic analyses of sign languages, calling into question the generally accepted use of the term *classifier*. In the process of transcribing child and adult utterances, we have also repeatedly faced the issue of the gesture-to-sign continuum and the linguistic status of a range of nonmanual components (face, body, posture, etc.).

We describe our approach as cognitive and functional, in that we are concerned with the learner's mental processes of analyzing events and signed utterances into components, with the aim of producing and comprehending utterances in communicative contexts. Our transcription system led us to reconsider the role of iconicity in ASL and SLN, bringing us to the new approach to classifiers presented here. To be sure, handshapes and movement paths are conventionalized and schematized in natural sign languages, yet early learners can make use of elements of natural gesture as a "bootstrap" device in entering the formal systems of the language. Research on both deaf and hearing toddlers has made it clear that there is no basic problem in using handshape and movement to make reference to similar objects and events across situations; and the same is true of hearing adult learners. However, although the entry into a sign language is easily accessible, mastery requires coordinations on many levels. The sorts of handshapes that have come to be called "classifiers" enter into combination with a number of simultaneous elements, using a range of motions, articulators (hands, arms, eyes, face, body), postures, and temporal variables. Furthermore, in representing events in a signed language, the signer has options of perspective and viewpoint, which provide for multiple means of encoding the same event participants. "Classifier" handshapes are embedded in predicates and nouns, and serve to index or identify discourse elements on the basis of various physical criteria. Thus their function is not so much to ***classify*** as to ***identify*** or ***designate***.

Our developmental focus, therefore, is on emerging abilities to flexibly manipulate such handshapes as parts of utterances that express particular meanings and viewpoints in ongoing discourse. We suggest that after an early phase of fairly successful mastery—for both deaf preschoolers and their hearing parents—there is a prolonged phase of learning to use the language as a flexible discourse tool. Problems are posed on several fronts: coordinating the use of two hands, choosing handshapes that allow for maintaining reference while shifting topic and/or focus—in short, constructing coherent and cohesive discourse. The "classifier" system is a central part of this complex task.

We begin with a discussion of combinatorial constructions in signed languages, in which classifiers are components of larger constructions. This will lay the groundwork for presentation of data on acquisition of such constructions.

POLYCOMPONENTIAL ANALYSIS

The relevant part of BTS for present purposes is its treatment of what have traditionally been called "classifiers." In BTS, signs that incorporate "classifiers" are treated like other complex signs, which we refer to as *polycomponential* signs. Like Engberg-Pedersen (1993), Schembri

(chap. 1, this volume), and others, we seek to represent the range of meaning components, both manual and nonmanual, that co-occur in complex signs. Our motivation is to devise a systematic approach toward citing each meaning component in complex signs. We have chosen to use *poly**componential***, rather than Engberg-Pedersen's *poly**morphemic***, because we are not ready to determine the linguistic status of each of the components, manual and nonmanual, in complex signs. And we have replaced Engberg-Pedersen's *verbs* and Schembri's *predicates*, with ***signs***, because the handshape expressions under study are used in verbal, adjectival, and nominal constructions.

Although various categories of polycomponential signs can be proposed, our work has focused on alternative conceptualizations of "classifiers." Rather than emphasize classification as the central feature of "classifier" handshapes in polycomponential signs, it seems more useful to treat them as marking a relevant property of a referent. The major function of such a handshape is to evoke a relevant referent in discourse, indexing a particular referent according to properties that are appropriate for the current discourse. That is, the "classifier" handshape designates, or specifies, or indicates a referent with a particular property (e.g., two-legged, horizontal plane, etc.). In BTS such handshapes are designated as ***property markers (pm)***. However, in the text of this chapter we continue to refer to them using the traditional classifier term, in quotation marks. The focus of this chapter is on the acquisition and use of verbs that contain property markers (with a few examples of nouns and adjectives).

Polycomponential verbs contrast with monomorphemic, or "plain" verbs. There are two types of polycomponential verbs: (1) those in which an unvarying handshape or handshape configuration follows a directed path through space ("agreement verbs" LOOK-AT, HELP, TELL in ASL and SLN), and (2) those in which both handshape and path direction can vary systematically and meaningfully ("classifier verbs," i.e., verbs of object transfer and movement, such as PUT, MOVE).[2] BTS does not distinguish between the path components of these two types. That is, all five verbs mentioned above can use the same set of path (source and goal) components. What is central to our analysis here is the elaboration of the handshape component. Specifically, an entity that is given or put, or that moves, can vary in size, shape, animacy, etc. (while the handshapes in verbs such as HELP and TELL do not vary.) Our focus in this chapter is thus on the second type of polycomponential verb, in which the "classifier" handshape is a meaningful component.

The signs in question have both manual and nonmanual components, and both types are given equal status in BTS (although the developmental and psycholinguistic issues raised in this paper deal primarily with the manual components). We determine if an element of a complex sign is a ***meaning component*** on the basis of substitution tests, working with native signers as experts.[3] For example, a variety of "classifiers" can be substituted in the same slot in the verb PUT in ASL and SLN, indicating the type of object that is being transferred, in addition to the default or lexical handshape that can be used when object characteristics are not at issue. Or the "two-legs" (inverted-V) component can assume a variety of postures and orientations, indicating that posture and orientation are meaning components. (See BTS for details.)

Because handshapes always occur simultaneously with movement/location, we think it is unproductive to argue whether one or another component is the "root" or "stem"; rather, we treat polycomponential signs as bearing similarities to "bipartite verbs" in spoken languages. For example, Delancey (1999) describes such structures in the Hokan and Penutian languages of northern California and Oregon, where there are systematic sets of verbs in which both parts are necessary components, and neither is a whole lexical item on its own. For example, one element of a bipartite verb can refer to the shape of a theme argument,

while the other element provides locative/directional information. Thus there are verbs with meanings such as 'rock_like_object-put_down', 'pole_like_object-move_up', and 'few_four_legged_animals -run_downhill'. Verbs in signed languages go beyond bipartite structures. A fully elaborated polycomponential sign can include one or more "classifiers," in particular orientation(s) and location(s), with a particular internal movement pattern and path in signing space, aspectual modification, and nonmanual modulations indicating speech act, affect, and discourse status. For example, in BTS, an ASL polycomponential verb meaning 'rapid mounted-riding comes to a halt' has the seven manual components listed below. (We have included BTS notation for those readers interested in pursuing the system further.)

- property marker: VERTICAL PLANE [ground entity] (`pm'PL_VL`)
- property marker: TWO-LEGS [figure] (`pm'TL`)
- location: TOP (`loc'PL_VL_TOP`)
- posture: STRADDLE (`pst'STR`)
- movement: FORWARD ROTATION (`mvt'LEX(ride)`)
- modification: RAPID (`mod'RAP`)
- aspect: CESSIVE (`asp'CES`)

```
(ride_mounted)-pm'PL_VL-pm'TL-loc'PL_VL_TOP-pst'STR-mvt'LEX(ride)
-mod'RAP-asp'CES
```

This example does not include simultaneous nonmanual components—which are applicable to all signs and sign sequences. Nonmanual components indicate such factors as negation, surprise, intensity, and so forth. The two property markers are only ***part*** of the total sign; they are not meaningful without the components of location, posture, and movement. Clearly, verbs in signed languages—in comparison with bipartite verbs in spoken languages—tend to be composed of more than two elements that cannot stand alone as complete lexical items. Furthermore, each of the components can be substituted by others. For example, the figure could be a small animal, the posture could be on top of the ground entity rather than straddling, the ground entity could be flat and horizontal, and so forth. Furthermore, other verbs can be derived by adding and removing components. For example, removing movement, modification, and aspect results in a static predicate of location ('be mounted, straddle'); adding a path for the figure as it moves away from the ground results in a dynamic verb ('dismount').

Our goal in this chapter is to explore the range of productive combinations in polycomponential verbs incorporating "classifier" handshapes as they develop in children and in adult second-language learners (hearing parents), and to begin to identify the discourse functions of such signs. We do not begin, in top-down fashion, with a fixed linguistic description of ASL or SLN. Rather, our analysis emerges in the process of attempting to transcribe signed utterances at a level of granularity that reveals their meaning components. BTS embodies our decisions about the componentiality of signs. Only after detailed comparison of learners' signs, using this form of analysis, will it eventually be possible to determine the extent to which the postulated components are productively used by signers. Nevertheless, the preliminary data sample presented here indicates quite clearly that novice signers, 2-year-olds and hearing parents with as little as 1 year or less of signing experience, are able to productively combine mean-

ing components of complex signs, using conventional ASL or SLN components, as well as, in some instances, ad hoc gestures and physical objects. "Classifier" handshapes are used to represent entities according to their size and shape and means of handling, as well as by less iconic, conventionalized handshapes ("class" or "semantic classifiers").

PREVIOUS STUDIES OF CLASSIFIER ACQUISITION

We have found only three studies of classifier acquisition in the literature; all of them deal with ASL, in deaf children of deaf parents, and use elicitation tasks (Kantor, 1980: nine children aged 3;0–7;0; Schick, 1990: 24 children aged 4;5–9;0; Supalla, 1982: three children aged 3;6–5;11). (Our sample is quite different: 35 children of both deaf and hearing parents, beginning at age 1;3.) These studies indicate, not surprisingly, that the full system of polycomponential signs is not mastered until late childhood. The youngest children who have been tested refer to moving or static figures by a referentially appropriate handshape, though sometimes failing to specify all relevant dimensions (e.g., appropriately indicating shape but not width), and sometimes using an incorrect form (e.g., using the 5-handshape for a person or car). Kantor (1980) reported that children as young as 3;0 "always matched classifier type to its object domain semantically" (p. 201). That is, referent designation or specification by means of property markers does not seem to be a problem for learners. Supalla (1982) presented animated films in which a figure moves with respect to a ground. Using such stimuli to elicit descriptions, the three children tested by Supalla provided a correct classifier for the moving figure 84% to 95% of the time, although, in his terms, sometimes a "general classifier" was substituted for a "specific classifier" (e.g., B-handshape for vehicles). However, children often omitted a secondary classifier for the ground entity. Schick (1990) found some classifier types to be used less accurately than others, but even the youngest children (4;5) used all of the types tested. These limited data indicate that by age 3;0, children designate the type of moving or located figure by the differential use of semantic handshapes. However, it will take them many more years to integrate the use of two hands, in relation to each other and moving through space with simultaneous facial and postural markers, incorporated into the flow of discourse.

Newport and Meier (1985) come to conclusions that are strikingly different from those suggested by our studies (reported below). Because children apparently have difficulty in integrating figure and ground classifiers, and in simultaneously indicating components of path and manner, Newport and Meier (1985) propose that "the relatively late acquisition of morphology in ASL may be due to its simultaneity" (p. 911). What they seem to have in mind, however, is the morphology required for movement from source to goal, in particular the movements that are described as "agreement" (that is, relations between initiator and recipient of literal or metaphorical object transfer) and the movements that require superimposition of several path elements (e.g., ARC + UPWARD). The simultaneous marking of type of moving figure and simple path seems to pose no problem for the youngest children tested in the studies described above (nor for the even younger children that we report on—and most of them with hearing parents). What is apparently more difficult is the representation of paths that have several meaningful components (e.g., both source and goal, or complex directions), as well as controlling the hands separately to indicate relations between figure and ground.

Newport and Meier (1985) also propose that the classifier system is a relatively late acquisition because the cognitive ability to classify is a relatively late cognitive development for children in general:

> Acquisition of the classifier system thus requires that the child have the ability to categorize objects into semantic or size/shape classes: human, animate nonhuman, plant, vehicle, and the like, or straight, round, large, small, and the like. It may in part be for this reason that the acquisition of classifiers in ASL does not begin until approximately age 3 and continues until perhaps age 8. (p. 915)

The abilities in question almost certainly develop earlier than Newport and Meier propose, as supported by a wide range of studies of infant and toddler cognition over the past two decades or so. But, in any event, their proposal assumes that the referential use of a handshape requires an act of classification (suggested by the misleading term, "classifier"). ***But all that is required is that the child indicate some property of the referent when choosing a handshape that takes the role of the referent.*** This is no different than, for example, the use of the pronouns *he*, *she*, and *it* by English-speaking preschoolers. That is, the child must recognize that mommy is female, that the ball is inanimate, and so forth. Even before age 2, children show evidence of recognizing distinguishing features of objects and responding differentially to them. And, as we show, 2-year-olds make appropriate—and even creative—use of handshapes to differentially reference different types of entities. In so doing, they make "depictive" use of handshapes.

It is evident in the data of these early studies, and even more so in our own studies, that very young children use "classifier" handshapes that are, in varying ways, ***iconic***. As Mandel (1977) argued almost a quarter-century ago: "An adequate account of American Sign Language must include the fact that the form various elements take in the language depends in part on the visual appearance of their referents" (p. 57). Mandel's (1977) definition of iconicity is useful here: the "use of signs and other gestures perceived as bearing ***some*** visual relationship to their referents" (p. 58). We have added the emphasis on "some" because there seems to be a tendency in a portion of the sign language literature to make a simple opposition between mimetic depiction, on one hand, and arbitrariness, on the other. However, a sign or handshape can be quite schematized and conventionalized, and still have some visual relationship to its referent. We have underlined this point in selecting the epigraph from Klima and Bellugi (1979) at the outset of this chapter. As Boyes-Braem (1981) laid out clearly in an early Berkeley dissertation on sign psycholinguistics, there is a necessary structural level in signed languages that is both iconic and constrained. Boyes-Braem built a detailed morphophonemic model of ASL handshapes, based on a "symbolic representation level." She discusses the generally arbitrary relationship between phonology and morphology in spoken languages, and draws a contrast with signed languages:

> In sign language, the relationship between the semantic components and the phonological forms is also arbitrary in that there are no semantic concepts which are universally and absolutely bonded with a particular manual form. Between the semantic and the phonological levels in sign language, there is also dual patterning and an ultimately arbitrary relationship.
>
> However, it seems necessary to postulate for sign language lexical structure an additional intermediary level which has no counterpart in most spoken languages. Whereas the semantic elements of spoken language are usually related directly to patterns of morphological forms, in sign languages there seems to be an intervening "symbolic representation" level.
>
> At the postulated Symbolic Representation Level, the underlying semantic concept is matched up with a visual symbolic representation or kind of visual metaphor. The metaphor might be based, especially for verbs, on some portrayable aspect of the underlying semantic components—e.g. the underlying agent can be symbolized by a grasp handshape; an underlying change of location represented by the location and movement parameters; an especially noted manner by the manner of the movement parameter (e.g., fast, slow, bumpy, smooth, etc.). (pp. 41–43)

Boyes-Braem (1981)goes on to clearly highlight ***both*** the representational and the arbitrary components of "visual metaphors": "[W]hat all the metaphors have in common are (a) their representability on moving hands, and (b) their representability with only those handshapes and movements belonging to a restricted set of handshapes and movements used in that particular sign language" (pp. 43–44). Building systematically on these ideas, Boyes-Braem succeeds in identifying a set of 26 morphophonemic handshape features which she tests against all of the non-initialized signs in the *Dictionary of American Sign Language* (Stokoe, Casterline, & Croneberg, 1965). Boyes-Braem succeeds in demonstrating systematic "visual metaphors" in a large portion of the ASL vocabulary.

Taub (2001) has recently expanded on this theme in a Berkeley cognitive linguistic dissertation on signed languages:

> In brief, ASL's iconic devices draw on our perception of hands, arms and fingers as having overall shapes, locations and movement; our ability to "see" the path that a moving object traces out in space; our knowledge that the signer's body is a human body, in shape and function like other human bodies; our additional knowledge that animal bodies often resemble human bodies in shape and function; our ability to recognize the body movements that go along with particular activities; our perception that body gestures take place over time and in space; and our knowledge of the movements of signing itself. (p. 67)

We believe that these cognitions and symbolic capacities are available to 2 year olds, deaf and hearing, with or without sign-language input. Yet the literature is full of claims that iconicity plays no role in the acquisition of sign languages. Newport and Meier (1985) take this position forcefully:

> In producing citation forms and omitting morphologically marked forms, the young signing child demonstrates a surprising disinterest in, or inability to take advantage of nonarbitrary relations between form and meaning (p. 907). …These studies, taken together and in combination with the other findings of relatively late acquisition of ASL morphology, demonstrate convincingly that the potential iconicity of ASL morphology does not assist in its acquisition (p. 908). …[I]conicity is virtually never a contributor to the acquisition process.…[I]t may be the case that the young child is cognitively unable to exploit the available iconicity, and that the iconicity of mapping between form and referent is accessible only to the older child or adult … (p. 916)

However, the iconicity that is at stake here seems to be that of movement patterns; there is no discussion of the iconicity of handshapes, which is central to the acquisition and creative use of "classifiers."[4] Indeed, Supalla 1982) gives a relevant example in his thesis, although without mention of iconicity:

> For a film in which a wing moves on top of the fuselage of an airplane, Randy [age 5;11] starts with the thumb of the airplane classifier bent, and then unbends the thumb to indicate that the airplane now has a wing. This kind of manipulation with classifiers is not part of the productive morphological system of ASL… It is interesting, however, that this occurs in the oldest subject, suggesting that he is beginning to "play" with the morphological system (as adults sometimes do). (p. 111)

Clearly, this child sees the L-I-handshape for 'airplane' as having a 'wing'—that is, it is not a totally arbitrary sign to him.

In contrast to Newport & Meier (1985), and Supalla (1982), Schick (1990) notes that SASSs (size-and-shape-specifiers) are produced accurately by her child subjects "because the morpho-

syntactic nature of SASS predicates is consistent with the fact that they categorize according to physical characteristics" (Schick, 1990, p. 368), and "that handshape use, for the most part, nears adult behavior at an earlier age than the use of spatial morphemes" (p. 370).

It is the motivated, nonarbitrary use of handshapes, across situations, that seems to be most relevant to arguments about both the developmental and the linguistic status of "classifiers." As discussed below, both deaf and hearing children, from very early on, use handshapes and gestures to refer to entities on the basis of salient properties of the entity or the means of its manipulation. We now turn to our data, from children younger than 3 years old, to suggest that iconic principles are available for productive and creative use of "classifiers" from early on.

EARLY USES OF SEMANTICALLY MOTIVATED HANDSHAPES IN POLYCOMPONENTIAL SIGNS

Deaf 2-year-olds, as well as their hearing, signing mothers, use handshapes meaningfully and productively as components of polycomponential signs. Our data are videotapes taken in children's homes in California and the Netherlands.[5] Here we report on deaf families who use a natural sign language at home and families in which hearing parents have undertaken to learn sign language (ASL or SLN) and use it as the basic means of communication with their children. Thus we can observe two kinds of learners: children acquiring an L1 and adults acquiring an L2. Because the children are no older than 3;9, and generally no older than 3;0, the mothers have been learning the sign language for 2 years or less—in some instances, as little as 4 months (SLN). We present the L1 and L2 data together here in order to demonstrate that similar processes are at work in both cases; that is, "early uses" refers to utterances produced early in the learning process. It is evident in our data that the fact that the mothers are acquiring a new language (and in a different modality than spoken language) in adulthood does not keep them from productive use of ASL or SLN morphology (as opposed to many claims in the literature that learners beyond a putative "critical period" do not analyze complex signs into their meaning components).

There is a plethora of terms for grouping "classifiers" into types. Schembri has provided a useful summary (chap. 1, this volume), and we adopt this terminology simply for the purposes of organizing our presentation, without making theoretical claims for the ontological status of these types:

- ***Handle*** handshape unit ("instrument(al)," "handle," "manipulator"): model of the shape of the hand when manipulating an object, or of the shape of the object being manipulated (see examples below)
- ***Entity*** handshape unit ("semantic," "whole entity," "static SASS," "object"): conventional means of representing an object (e.g., 3-handshape for vehicle in ASL)
- ***SASS*** handshape unit ("size and shape specifier," "descriptive"): model of relevant physical dimensions of an object

In addition, we subdivide the ***handle*** category on the basis of whether the handshape represents the hand that is manipulating an object—***manipulative handle***, or whether the handshape represents the object being manipulated—***depictive handle***. For example, in ASL, the use of a screwdriver can be represented by a rotating S-handshape for the grasping hand (manipulative handle), or by a rotating H-handshape for the tip of the screwdriver (depictive handle). Although

depictive handles and entity handshapes may use the same property marker (pm) components, they are distinguished in that handles imply agency.

For each of these three types, we offer several examples demonstrating that the learner is using a handshape beyond a "frozen" form. That is, the handshape is used creatively to designate an object of a particular type, involved in the predication of an activity or state. The following abbreviations are used: HM = hearing mother, DH = deaf child of hearing parents, DD = deaf child of Deaf parents. Age is indicated in the format *years;months*, designating the age of child (C) with regard to both the child's and the mother's utterances. For mothers' utterances, we also indicate, in the same format, the length of time that the mother (M) has been learning sign language. Utterances with only a C are signed by the child; those with both C and M are signed by the mother. The line labeled "Utterance" is a discursive description of the signing, including designations of handshapes using the ASL manual alphabet. This line is intended to enable readers to visualize the utterance. We also provide BTS transcriptions of each utterance in order to demonstrate our use of the system. Note again that we are not claiming that the signer has active and productive control of each of the units in the transcription; productivity can only be ascertained from patterns attested in a large corpus of utterances from an individual signer. Rather, the componential analysis suggests the degree of complexity that is inherent in a sign and which may form the basis for analytic activity on the part of the learner. (BTS transcriptions are presented in a different font, so that the reader can easily focus on them, or ignore them. We have tried to make the examples clear on the Utterance line, without reference to BTS conventions.)[6]

Manipulative Handle Handshapes

These handshapes are perhaps the easiest to acquire because they represent the movement of the hand(s) in manipulating the object that is referred to (generally an incorporated patient of the verb). As Taub (2001) points out: "The use of body and instrument classifiers is strongly motivated by the distinctiveness of body actions: sometimes it is easier to produce and recognize body movements associated with an object than an analogue of the object itself" (p. 77). Often such handshapes are literal gestures of an activity, and it is only the factor of conventionalization in the speech community that distinguishes sign from gesture. (We return to this point in discussing the psycholinguistics of sign acquisition and the role of gesture for children who do not receive sign language input.) For example, a Dutch girl of 2;6 tells the researcher about a photograph of her father pushing her in a baby buggy:

(1) MANIPULATIVE HANDLE [DH, SLN, C:2;6]

Situation: Child seated on floor; describes photo in which she is seated in a baby buggy (pram) being pushed by her father.
Utterance: Extends 2 S-hands, palms down, arms straight, and moves arms forward.
Translation: '(He's) pushing.'
Transcription: `(push)-pm'HO_S(2h)-pth'F.`

The next example, from an American girl of 2;5, is similar. Note than in both (1) and (2), the sign is performed in space, without a ground object. That is, the buggy or the suitcase have to be imagined as located at the point of manipulation.

(2) MANIPULATIVE HANDLE [DD, ASL, C:2;5]

Situation: Mother asks child how she should open a suitcase (HOW OPEN HOW ?). Child responds by demonstrating how to unzip the suitcase.
Utterance: Baby-O handshape moves from front of signer leftwards.
Translation: 'This is how to unzip it.'
Transcription: `(unzip)-pm'HO_BO-pth'S .`

Hearing mothers also use handle handshapes with ease, incorporating handshapes into gestured actions. This feature of signed languages allows novice signers to produce utterances that are meaningful and comprehensible (whether or not they correspond to conventional signs). Consider an utterance from the mother of the child in example (1). She had begun to learn SLN only 8 months earlier, and produced an utterance that is appropriate in the language:

(3) MANIPULATIVE HANDLE [HM, SLN, C:2;6, M:0;8]

Situation: Child puts doll in toy cradle and kisses it goodnight. Mother tells child to close the curtains around the cradle.
Utterance: 2 S-hands move in closing arc towards mother's chest.
Translation: 'Close the curtains.'.
Transcription: `(close)-pm'HO_S(2h)-pth'B_EO .`

Depictive Handle Handshapes

Depictive handles are more demanding than manipulative handles, in that they require the learner to choose an appropriate handshape for representing the salient dimensions of the object to be handled, rather than representing the manipulating hand itself. Nevertheless, they appear very early in our data. The range of appropriate and inappropriate uses reveals the learner's mastery of the conventional parameters of the language. Note that these parameters map out a lexical space that retains depictive or iconic features, in that the handshapes reflect general physical properties of the referent objects. Examples (4), (5), and (6) all deal with placement of a thin, flat object. Although the first two, representing placement on a flat surface, present no problems, the third example shows that the child has to learn when depth or thickness is a relevant parameter in the language. Note the precocity of (4): depictive handles appear to be available to DD children at a very early point in development.

(4) DEPICTIVE HANDLE [DD, ASL, C:1;10]

Situation: Deaf assistant tells child to put a book underneath a table where another book is already located. Child comments, putting her book on top of the other one.
Utterance: Closed-5 on nondominant hand, palm up. Closed-5 on dominant hand, palm down, makes contact with palm of nondominant hand (instead of back of hand, as conventional).
Translation: 'I'm putting the book on another book.'
Transcription:
```
(put)-pm'PL_G(G)*-pm'PL_H(F)-gol'TOP_PL_G [*] .
                    %err: PL_G $hs = PL_H
```

(5) DEPICTIVE HANDLE [DH, SLN, C:2;11]

Situation: Child comments to mother about putting flat rubber alphabet letter in the corresponding puzzle space.
Utterance: Points to puzzle space then moves horizontal flat 5-hand (palm down) to the space.
Translation: 'Put it here.'
Transcription: `PNT_3(puzzle_space) (put)-pm'PL_H-gol'OBJ(puzzle_space).`

The child can also miscategorize an object from the point of view of conventions of the language. In the following example, the child treats a flat, round puzzle piece as a cylindrical object with depth, whereas an adult would treat it as essentially two dimensional. Perhaps the task of inserting it into the puzzle highlighted its three-dimensional quality to the child; or perhaps this is a phonological error, reflecting lack of fine digit control.

(6) DEPICTIVE HANDLE [DD, ASL, C:2;6]

Situation: Child is commenting on what she has to do with a round puzzle piece in order to fit it into its correct location on a puzzle board.
Utterance: C-handshape (palm sideways) moves downward to make contact with puzzle board.
Transcription: 'I have to put the circle here.'
Transcription:
```
(put)-pm'CYL*-gol'OBJ(puzzle) [*] .
                          %err: CYL $pm = FD
```

There are instances in ASL and SLN in which a handshape functions as both a manipulator and a depictor. For example, the C-hand can represent both a hand that is manipulating a cylindrical object and the object itself. That is, in some cases the hands that depict physical characteristics of the object are also the hands that move the object from one location to another. In other instances, there are subtle differences between the handshape form for manipulation and depiction. For example, in SLN the B-hands that move a box-like object have extended thumbs, indicating that the object is being held, while flat B-hands are used—in the same facing-palm configuration—to depict a box-like object. It may well be that early learners do not clearly distinguish manipulation from depiction in such instances. Consider, for example, the following utterance of a girl of 2;6. She is relating an event in a photograph to the researcher, explaining that her father had to maneuver a large, heavy object through a doorway.

(7) MANIPULATIVE/DEPICTIVE HANDLE [DH, SLN, C:2;6]

Situation: Description of photograph of father carrying a large, heavy object and turning it through a narrow doorway.
Utterance: 2 flat, lax, closed-5-hands, palms facing, arms outstretched; child turns to left, turning wrists and rotating right hand over left hand, keeping palms facing; straining face: squint, tight mouth
Translation: '(Daddy) carried a big, heavy box and had to turn it to get it through the doorway.'
Transcription: `(carry)-pm'BOX(2h)-mvt'PIV_L-^mod'EFFORT.`

The presence of nonmanual indications of effort and straining, accompanied by turning of the body, suggest that this utterance is heavily gestural, yet bearing the seeds of grammatical form. That is, depiction may begin with a strong gestural component, and only later develop into more abstract and general forms.

Entity Handshapes

Schick (1990), using a picture elicitation task with DD children aged 4;5 to 9:0, found that entity handshapes (her "CLASS") were the most likely classifier type to be correctly produced by the youngest children. The entity handshapes in her task were the V-handshape for a person and the 3-handshape for a vehicle. Schick attributes this finding to the fact that such handshapes do not undergo modifications for physical dimensions of size and shape. Entity handshapes also occur in our data, indicating that 2-year-olds can combine components of figure and path in a single sign (in contrast to Supalla's [1982] report that even 3-year-olds have difficulty in integrating such components). The following free-play utterance clearly demonstrates appropriate use of an entity handshape at 2;8. Note that the child is using the SLN "classifier" for 'airplane' to refer to a helicopter, indicating that he is treating the handshape as referring to a type of entity.

(8) ENTITY [DH, SLN, C:2;8]

Situation: Child describes descent of helicopter.
Utterance: Y-hand moving in downward arc.
Translation: 'Helicopter descends.'
Transcription: `(descend)-pm'AIRPLANE*-pth'DA [*] .`
`%err: pm'AIRPLANE $pm pm'PTH`

The data contain examples of skillful use of entity handshapes in utterances that have several simultaneous or overlapping meaning components. The following examples are from two signers who are competent, one a younger DD child (2;9), and the other an older DH child (3;8). In the first example, the child is engaged in book reading with her deaf mother (she also has a deaf father). She describes a picture of an ambulance with lights on top, modulating her 2-handed CAR into a 1-handed VEHICLE entity that serves as ground for the LIGHT indicated by the other hand.

(9) ENTITY [DD, SLN, C:2;9]

Situation: Child describes picture of ambulance with light on top.
Utterance: Points to picture. Signs CAR with 2 hands, then changes left hand into flat plane, raises right hand to sign LIGHT, then lowers right hand, onto top of left hand. Points to picture.
Translation: 'There's a car with a light on top. There.'
Transcription: `PNT_3(on_picture) CAR(2h) LAMP (located)-pm'VEH(G)-~`
`LAMP-loc'TOP_VEH PNT_3(on_picture).`[7]

The next example is interesting, in that Supalla (1982) found that simultaneous signing of path and manner posed difficulties to DD children in the task of providing descriptions of animated film clips. It may be that such combinations are easier in free play situations such as the following:

(10) ENTITY [DH, ASL, C:3;8]

Situation: Child pretends that lego tower is a bell tower; He describes person entering tower to ring bell.
Utterance: Inverted-V handshape with fingers wiggling, moves forward away from signer's body.
Translation: 'The person walks forward.'
Transcription: `(walk)-pm'TL-pst'ERC-pth'F-mvt'WIG .`

There are numerous examples in our data demonstrating that learners—children and adults—often treat entity handshapes as having "depictive" or "iconic" characteristics, rather than simply being unanalyzed designations of objects of a particular type (as in Supalla's "airplane wing" example cited above). In the following example, a hearing mother gives evidence that she considers the V-handshape (= person) to have internal components:

(11) ENTITY [HM, ASL, C:3;9, M:2;7]

Situation: Mother instructs child to place doll on bed with legs extended outward (elicitation task).
Utterance: V-handshape bent back at knuckles, placed on flat palm of other hand.
Translation: 'Put the doll on the bed with her legs extended in front of her.'
Transcription: `(sit)-pm'PL_G-pm'TL-pst'SIT(bent_waist)*-loc'TOP_PL_G [*] .`
`%err: pst'SIT(bent_waist) $hs = pst'SIT`

It is evident that this mother sees the V-handshape analytically: the two fingers are legs, the back of the hand is the torso, and the knuckles are the waist, which can be bent to indicate a figure whose body is bent at the waist. By contrast, a deaf mother, using the same doll in an elicitation task with a child of about the same age, appropriately indicates the posture of the doll, placing the V-handshape according to the conventions of ASL, which, although arbitrary, still have some iconicity.

(12) ENTITY [DM, ASL, C:3;8]

Situation: Mother asks child to make doll sit with its legs straight out, in contrast to the previously produced handshape, indicating the doll kneeling.
Utterance: Nondominant hand is a closed-5 handshape (palm up); dominant hand is a V-handshape (palm contacts palm of nondominant hand).
Translation: 'Sit the doll with her legs extended in front of her.'
Transcription: `(sit)-pm'PL_G-pm'TL-pst'SIT-loc'TOP_PL_G .`

Entity handshapes are also used to describe objects that are remembered, as well as present objects and pictures of objects. The following example includes depictive elements in referring to an object with an entity handshape configuration. A child of 2;6 is reminiscing with her mother about having seen a hot-air balloon at a shopping mall. Note the use of both hands and accompanying arm extension and nonmanuals to indicate exceptional size.

(13) ENTITY [DH, SLN, C:2;6]

Situation: Child describes hot-air balloon seen on earlier occasion.
Utterance: 2 curved vertical 5-hands, palms facing, arms extended wide and drifting about, puffed cheeks and pursed lips
Translation: 'A very big balloon (was) floating about in the air.'
Transcription: `(float)-pm'SPHERE(2h)-mvt'WANDER-^mod'AUG .`

Children's imitations of adult utterances provide information about the "growing points" or "zone of proximal development" in their signing. In Lindert's (2001) comprehension task[8], 2-year-olds generally had difficulty coordinating two handshapes when one represented a type of

figure and the other a type of ground, or two figures in relation to one another. (Signing on objects and on the body—the child's or adult's—is often a solution to the difficulties of providing simultaneous signed information about figure and ground. This is also a part of child-directed signing.) It is interesting, therefore, that a child can manage to control both hands—indicating figure and ground—when provided with an adult model. This sort of simultaneity is apparently understood before it can be integrated in the child's own productions, as shown in the following example.

(14) ENTITY [DD, ASL, C:2;1]

Situation: Child copies mother's description of doll standing on toy chair.
Mother's Utterance: Nondominant hand in a relaxed 5-handshape (palm down). Dominant hand in an inverted-V-handshape located on the top of the nondominant hand.
Translation: 'The doll is standing on it.'
Transcription: `(stand)-pm'PL_H-pm'TL-pst'ERC-loc'TOP_PL_H .`
Child's Utterance: Nondominant hand in a relaxed 5-handshape (palm down). Dominant hand in an inverted-H-handshape located on the top of the nondominant hand.
Translation: 'The doll is standing on it.'
Transcription:
```
(stand)-pm'PL_H-pm'TL(closed)*-pst'ERC-loc'TOP_PL_H [*].
                    %err: TL(closed) $hs = pm'TL
```

SASS Handshapes

We have not yet found examples of SASS handshapes in our child data. This may be because, in naturalistic and elicited description settings, the physical objects are generally present, and the conversation centers around identifying, describing, and manipulating individual objects. Schick (1990) found good control of SASSs in her elicited picture description task, where they were used adjectivally to describe inanimate objects. Her youngest subjects, however, were 4;5—far beyond the range of our samples. In our data, thus far, we have only found such descriptive uses of SASS handshapes in adult utterances. For example, a hearing mother in Lindert's placement task describes the shape of an object that the child is supposed to identify and place. Note, however, that this is not a correct ASL use of a SASS. She does not use the form purely as a description, but also uses it to designate an object in a verb of location:

(15) SASS [HM, ASL, C:3;1, M:1;7]

Situation: Mother indicates where toy couch should be located.
Utterance: Two open-G-handshapes, palms down, start out with thumb sides in contact. Hands move away from each other.
Translation: 'Put that object, shaped like this, here.'
Transcription:
```
(located)-pm'TR_G(2h)*-trc'LONG [*] .
                %err: TR_G = $hs TR_C
```

MEANINGFUL USE OF HANDSHAPES BY CHILDREN WITH NO EXPOSURE TO SIGN LANGUAGE

Depictive gesture is a natural part of human symbolic competence, found in the gestures that accompany speech, as well as in homesign systems used by deaf children raised orally, and even in

prelinguistic hearing infants. Here we focus on the forms of handshapes used in iconic or mimetic gestures, although the dynamic components are also a necessary part of depictive gesture. It is already evident from the discussion of learners of ASL and SLN that there is a continuum from ad hoc gestural use of handshapes to conventionalized sign components. It is often not possible to determine if a learner has devised a handshape on the fly or is using a conventionalized "linguistic" element. Consider, for example, the 2-handed handle handshape in example (1), used by a child of 2;6 to refer to pushing a baby buggy. Similar referential uses of handshapes are found in the gestural communications of deaf children raised without sign language input (*homesign*).

Meaningful Use of Handshapes in Homesign

Homesign systems have been extensively documented by Susan Goldin-Meadow and her collaborators (Goldin-Meadow, 1979, 1982; Goldin-Meadow & Morford, 1990; Goldin-Meadow, Butcher, Mylander, & Dodge, 1994; Goldin-Meadow & Mylander, 1984, 1990a, 1990b; Goldin-Meadow, Mylander, & Butcher, 1995; Morford & Goldin-Meadow, 1991, 1997; Morford et al.,1995). These studies demonstrate that individual deaf children systematically use a limited set of handshapes, combined with motion, to refer to objects ***on the basis of specific physical properties***. Goldin-Meadow, Mylander, et al. (1995) carried out a detailed analysis of components of handshapes in four homesign systems, created by children between the ages of 2;10 and 4;11. All four children used a set of basic handshapes, described by the researchers as Fist, O, C, Palm, Point, Thumb, V, and L. Handshapes were used as ***handles***, ***entities***, and ***SASSs***, in the terminology used above. Components of hand breadth and finger curvature systematically mapped onto features of the referenced objects: Point and Thumb handshapes referred to manipulation of very narrow objects, Fist and O referred to wider objects, and C and Palm were used for the widest objects. For example, all four children used a large C-handshape to represent handling an object greater than 2 inches/5 cm in width. All of the children used Point (index finger) for straight skinny objects, such as straws, candles, pencils. Three of the children used a flat palm for vehicles. Overall, handshapes could be placed in systematic paradigms or matrices of contrasts for each child. In addition, most handshapes were combined with one or more type of motion. Goldin-Meadow, Mylander et al. conclude:

> Thus, the gesture systems of the deaf children in our study appear to contain a subset of the handshape and motion components found in ASL. The similarities between sign forms in ASL and gesture forms in our subjects' gesture systems suggest that our subjects' set may reflect the units that are "natural" to a language in the manual modality—units that may form part of the basic framework not only for ASL morphology but also for the morphologies of other sign languages.…Whatever the details of the gesture systems, the fact that the gesture systems of all of the deaf children in our study could be characterized as having a morphological structure suggests that such structure is essential to the young communicator—so essential that it will evolve even in the absence of conventional linguistic input. (pp. 243–244)

Homesign use of handshapes is systematic and productive, in that a gesture that indicates a particular object property is regularly applied to a range of objects for which that property is salient. It is also noteworthy that such a system can be maintained over the course of years by an individual child. The child called David used his handshapes consistently from age 2;10 to 9;5 (Morford, Singleton et al., 1995). And, in fact, when he began to learn ASL, he had difficulty with referential ("classifier") categories that did not match those in his homesign system, al-

though he easily acquired ASL categories that overlapped with his own. Apparently he had stabilized patterns of "thinking for signing" in his L1 (homesign), and had difficulty acquiring alternative category structures for the same domains in L2 (ASL). (This parallels effects of "thinking for speaking" on L2 acquisition described by Slobin, 1996.)

In the light of such findings, it is not surprising that deaf children with sign language input also make early meaningful use of handshapes in complex signs. Indeed, it would be difficult to gesture about the movement of an object—either as manipulated or self-moving—without in some way modifying the handshape to correspond to some component of the object or the hand that deals with it.

The "classifier" systems of sign languages are, by and large, not made up of arbitrary symbols. Nonetheless, in mastering a natural sign language, the learner is faced with the task of acquiring the particular handshapes that are conventionalized in the language. This task becomes more difficult at the less transparent end of the gesture-to-sign continuum. Defining the parameters and dimensions of this continuum is an urgent task. The early uses of handshapes in acquisition of a standard sign language, along with the productions of homesign children, can provide suggestive evidence about the "gesture" end of the continuum. Errors, substitutions in imitation, and later acquisitions in a standard sign language (discussed below) can illuminate the "sign" end of the continuum.

Meaningful Use of Handshapes by Hearing Infants ("Baby Signs")

Acredolo has documented a wide range of symbolic gestures used by prelinguistic infants as young as 11 months, and continuing through the early one-word period (Acredolo & Goodwyn, 1988, 1990, 1992). This research builds on a long tradition in developmental psychology, best represented in the writings of Werner and Kaplan (1963). Werner and Kaplan, following earlier work by Piaget, Guillaume, and Stern, saw early gestural representation as part of symbolic development:

> The formation of descriptive gestures… seems to suggest that the child has begun to translate realistic events into a medium with its own expressive features: the imitative expressions have developed into truly *pictorial* or *iconic* representations. Thus, with apparent spontaneity, the child, by means of sensory-motor patterns, creates what have been termed "natural symbols." (p. 89)

They trace such gestures to anticipatory or preparatory motor patterns, evolving into representational actions. For example (citing unpublished work from 1930), they describe a 15-month-old child, looking for a shovel to use in a sandbox, and making shoveling movements with his hand "in a scooping position" (p. 93). They note that such gestures can also be used outside of the sandbox context to communicate desires and intentions. And they emphasize that representative gestures become schematized:

> It is important to note that the transition from anticipatory behavior to representative gesture is often marked by a change in the form of the activity: movements which derive from pragmatic actions but which have become depictive gestures are in subtle ways distinct in pattern of execution from anticipatory responses. A good example of this is the difference observable between *anticipatory movements* in cutting with scissors and *representative gestures* of cutting with scissors. In the first instance, the individual sets thumb and forefinger in a way to fit into the handle of the scissors. When, however, one exploits the pragmatic action for representation, there is a change in the selection of fingers and in the manner in which they are held. The movements do not correspond with those of actual cutting; instead, they express the dynamic activity of "scissors-cutting" by imitating the movements of the instrument [i.e., a transition from manipulative to depictive handles]. (p. 94)

Acredolo and Goodwyn (1988) have studied numerous infants, documenting "the spontaneous development by normal infants of nonverbal gestures to symbolically represent objects, needs, states, and qualities" (p. 450).[9] They excluded gestures that were part of fixed routines, or one-time occurrences. The data consist of gestures that were regularly applied to multiple instances of the same referent or situation, across contexts. Some of these seem to be instances of SASSs, such as the infant who referred to the moon with a "cupped hand held high" (Acredolo & Goodwyn, 1988, p. 456). Others are handles, such as "fist to ear" for telephone. In a systematic study, it was found that "handles" were the predominant form, but SASSs were also found: "The results showed a clear preference for using an imitation of an action the child did with the object (45% of the total). An additional 13% of the total were imitations of actions inherent in the object, and 10% were depictions of some perceptual quality of the object" (p. 460).

Implications for Acquisition of Signed Languages

It seems, thus, that the basis for gestural representation in homesign is part of general infant and toddler competence. If all children can invent and use handle (both manipulative and depictive) and SASS handshapes, the course of acquisition of a sign language, such as ASL or SLN, is rather different than acquisition of a spoken language. Verbal representation is a break from the earlier, expressive uses of vocalization and gesture. The hearing child cannot spontaneously invent vocal meaning components that will successfully communicate. For example, knowing the word *open*, the child cannot invent a vocal sequence that would be interpreted as *close*. The same is true of a child learning a "classifier language" such as Navajo. For example, having learned that *-ltsòòz* means 'lie: flat-flexible-object', there is no way that the child can invent a term for a pile of objects. Rather, the child has to wait and learn another unanalyzable element: *-nìl* 'lie: collection'. The deaf child, by contrast, can easily communicate within the general framework of the language. Transient innovations may be close enough to a conventional "classifier" to pass unnoticed, or to be easily shaped into the conventional form. The capacity to represent objects and their movements/locations by means of arm and hand is given from the start. The deaf child, therefore, follows a special developmental path, in that normal gesture can be "seamlessly" incorporated into the flow of signing. As a consequence, the deaf child—in contrast to the hearing child—has the task of "paring down" the gesture system to those elements that are conventionalized in the exposure language. The child acquiring a signed language must also learn how to appropriately incorporate ad hoc gestures into signed utterances in ways that match the adult system. At the same time, of course, both deaf and hearing children must acquire the less transparent parts of the language as well.

Beyond this, the greatest challenges lie in mastering the discourse functions of polycomponential signs, including nonmanual components of face and body. These challenges become evident by age 4 or 5 and continue through the school years.

PROBLEMS OF MASTERING POLYCOMPONENTIAL SIGNS BEYOND THE EARLY PHASES

Thus far we have dealt with issues of selecting semantically appropriate handshape(s) and integrating handshapes into polycomponential signs, along with other meaning components. Our data show clearly that these basic skills are established by age 3. However, even 12-year-olds do not use the entire set of options in adultlike fashion. By and large, our preschool recordings con-

tain short utterances, usually scaffolded by interaction with adults. New demands are placed on the child when longer stretches of signing are required. This is especially evident in narrative, where the signer has to create a spatial scenario and maintain reference to individuals while shifting perspective. Additionally, the sequence of utterances must have coherence in terms of space, time, and causality. These are complex tasks for children learning any language, signed or spoken (see, e.g., Berman & Slobin's, 1994, crosslinguistic and developmental study of narrative from ages 3 to 9).

We have two sets of narrative data that allow us to focus on these issues. The first set comes from a late preschool setting (about age 5) in which an ASL-signing child presents a personal narrative to a circle of other children and a deaf teacher. The second set consists of narratives elicited by a picture-storybook, *Good dog Carl*, signed by children aged 9–12. These school-age narratives are elicited in a test situation with a single deaf adult as addressee.[10] In this part of the chapter we provide more detailed descriptions of examples, in order to graphically demonstrate some of the discourse-pragmatic factors that are an essential part of mastering polycomponential signs. We have selected examples in which narrative coherence and cohesion require choices of "classifier" handshapes that are not simply motivated by semantics of reference, but also require attention to factors of viewpoint and narrative continuity. It will become evident, in going through these examples, that the mastery of "classifier" selection is an essential part of mature communicative competence.

Establishing Reference

Earlier in this chapter, we described very young children's use of handle and entity "classifiers" in interactions with adult interlocutors. In those examples, the children often produced polycomponential signs without first naming the referents that were represented by the handshapes. Because the conversation generally revolved around present objects and people, this was usually not a problem. However, in order to use "classifiers" appropriately, especially in a monologue or a narrative without adult scaffolding, generally the signer must first name the referent, which will then be represented by a handshape in a polycomponential sign. Without such indication, the intended reference may fail to be identified by the addressee. When the responsibility of clearly naming the referents of "classifiers" rests with young signers, they have difficulty, as illustrated in the following example:

(16) ESTABLISHING REFERENCE [DD, ASL, C:5;0]

Situation: Child describes going swimming and sliding down into the water (as part of a longer narrative).

Utterance: Nondominant hand in B-handshape with palm facing the signer and fingertips pointing right. The dominant hand, in a bent-V-handshape, starts above the nondominant hand and moves away from the signer with a downward slope, bending and unbending the fingers.

Transcription: `PNT_1 HAVE BIG (slide)-pm'PL_VL-pm'TBL-src'SUP_PL_VL-pth'DF-mvt'BEND*-asp'ITR* [*] .`

```
%err: referent of pm'PL_VL (noun SLIDE) is absent ;
mvt'BEND-asp'ITR $mvt = mvt'0-asp'0
```

With the limited context and lack of clearly stated referents, there are two possible ways to interpret this child's utterance. She was probably referring either to a swimming pool with

a slide or to a giant water slide. In either case, the combination of the path component 'going down' with the movement component 'repeatedly bending legs' is ungrammatical. (If she was referring to going down a slide at a swimming pool, her awkward construction may have been due to an attempt to depict both the ladder and the slide, superimposing the climbing component and the sliding component—in effect, signing that she was going down the steps on a slide). She may have thought that the polycomponential sign was sufficient to make clear reference to the slide. The complexity of the "classifier" configuration (as well as the complexity of the underlying visual image) may have given the child the false impression that her utterance was clear enough to be understood by the audience.

Specifying Ground

When using polycomponential signs, signers are often required to include "classifier" handshapes for both the figure and ground elements. The ground "classifiers" can serve to anchor a signer's description of an object, or they can serve to specify the shape, scale, and focus of the surface with which the figure interacts. Our data suggest that very young children often omit ground "classifiers," and that children of late preschool and early school age have difficulty incorporating ground "classifiers" correctly in polycomponential signs (as noted by Supalla, 1982). Older school-age children seem to exhibit a more sophisticated understanding of the various functions of ground "classifiers."

Ground as Anchor. Describing an object is a complex process in which the description of the parts and their relationship to each other must be constructed in a manner that is semantically acceptable as well as grammatical. It often requires the simultaneous use of both hands, with each hand functioning as a separate articulator. In such a scheme, the nondominant hand serves as the ground and is the reference point for depicting the location of another element being described. An example is the task of describing a cylindrical lampstand with grooves that run the length of the stand. The shape of the stand is first described using two cupped hands in which the nondominant hand remains at the base and the dominant hand moves up away from the base. The nondominant hand, still in the C-handshape, then moves up to assume a new grammatical function: It now serves as a ground representing the lampstand. The dominant hand simultaneously assumes a new handshape (the 4-handshape) in order to describe the grooves in the stand. Although adult signers competently use the nondominant hand to serve as an anchor when describing portions of an object, young children have difficulty coordinating the use of the nondominant hand for this purpose, as seen in the following example:

(17) GROUND MAINTENANCE [DD, ASL, C:5;0]

Situation: Child narrates a story to her preschool class about her family's summer camping trip. In this example, she describes the tent her family used.

Utterance: Child uses forearm and 4-handshape of dominant (right) hand set at an angle with palm facing left and downward to indicate the side of the tent; this configuration moves downward and toward the right. Then to indicate the other side of the tent, the child dramatically moves her body toward the left and, using her dominant forearm and 4-handshape set at an angle with palm facing right and downward, moves her arm downward and towards the left.

Transcription: `TENT MIXED COLOR .`
`ORANGE (located)-pm'TR_5*-trc'DR [*].`

YELLOW (located)-pm'TR_5*-trc'DL [*].[11]
%err: missing non-dominant hand as anchor

The child did not use her nondominant hand as an anchor, as an adult signer would in this situation. The anchoring use of the nondominant hand enables the signer to succinctly and grammatically indicate the location of the portions of the tent being described. In the case of this child's description, in the absence of an anchoring handshape, she had to use an exaggerated body shift to clarify which side of the tent was being described. The resulting description is both phonologically awkward and ungrammatical.

Scale of Ground. When using a polycomponential sign that depicts a figure moving or located with respect to a ground, it is critical that the scale of the figure and ground "classifiers" correspond with one another. Problems of relative scale pose difficulties to learners, because the same referent can be represented by different handshapes, depending on how their relative sizes are conceptualized in the projection from mental space into signing space. Scale is also determined by viewpoint, requiring attention to perspective, as discussed in the next section. In the following example, the child is relating an attempt to crawl through a small opening (note that in addition to problems of scale, she also has failed to name the type of opening).

(18) SCALE OF GROUND [DD, ASL, C:5;0]

Situation: Child describes her attempts to crawl through some type of small opening.
Utterance: F-handshape on nondominant hand. V-handshape (fingers first) moves into F-handshape.
Transcription: (crawl)-pm'CIR*-pm'TL-pst'RCL-ori'B-mvt'WIG-gol'INT_CIR [*] .
%err: CIR $hs = CYL

This signer's choice of a ground "classifier" does not provide an appropriate scale. The F-handshape represents a view from a distance, while the V-handshape represents a close-up view. This lack of correspondence between the scale of the figure and ground "classifiers" leads to a phonological problem, in that the signer cannot fully fit the figure "classifier" through the ground "classifier," as she presumably intended to do. An adult signer would probably choose a C-handshape for the ground, allowing the V-handshape, representing the figure, to pass through it.

Our school-age data show that by age 12, nonnative but skilled signers can successfully choose figure and ground "classifiers" that correspond with one another appropriately in terms of scale. The following example is comparable to (18) in that the signer still intends to show a figure moving through a cylindrical ground. However, unlike the late-preschool-aged signer in the example above, the older signer correctly chooses the C-handshape to describe the ground.

(19) SCALE OF GROUND [DH, ASL, C:12;2]

Situation: Child describes a picture of a baby sliding through a laundry chute.
Utterance: Dominant bent-V-handshape moves downward through nondominant C-handshape.
Transcription: (slide)-pm'CYL-pm'TBL-src'INT_CYL-pth'DF .

Flexibility of Focus. A third function of the ground "classifier" is to focus the addressee's attention on a particular feature of the ground in the scene being depicted. In example (19), the signer

is focusing the addressee's attention on the fact that the baby is sliding down a chute. However, this utterance was actually part of a longer portion of the narrative in which the signer first described how the baby was perched at the edge of the chute before sliding down (20). (The actual sequence of utterances was 20–19.) Although the picture showed the baby sliding down toward the viewer, the signed perspective is from the point of view of a narrator watching from behind the baby. In this portion of the description, the signer focuses the addressee's attention on the baby's position at the top of the chute by choosing a B-handshape (palm down), rather than a C-handshape, to show the opening of the chute.

(20) FLEXIBILITY OF FOCUS [DH, ASL, C:12;2]

Situation: Child describes a baby perched at the top of a laundry chute, ready to slide down.
Utterance: Dominant bent-V-handshape on top of nondominant B-handshape (palm down). .
Transcription: `(perch)-pm'PL_H-pm'TBL-loc'TOP_PL_H .`

After this polycomponential sign, the signer describes the baby beginning to slide down the chute, the baby's heart racing, and the chute whizzing by the baby, thereby changing the focus to the experience of the baby going through the chute. In accord with this new focus, the signer produces the utterance in (19), in which the ground "classifier" represents the opening to the chute. In this sequence of utterances, we see perspective shifts from narrator to protagonist and back to narrator. In addition, the use of ground "classifiers" shifts along with focus. Thus, in order to create a coherent and cohesive narrative discourse, the signer has to attend to a range of pragmatic and semantic factors in choosing appropriate handshape "classifiers" in polycomponential signs.

Choosing from Among Multiple Perspectives

Perspective, or viewpoint, thus presents major challenges to the sign language learner. There are several types of perspectives, depending on the roles of narrator and protagonist(s), and conditioned by phonological constraints. When signing as narrator, a scene can be presented from many different physical angles. An event can be viewed from one vantage point and then described further from a different orientation. In addition, the signer constantly faces the task of deciding which perspective will best allow for an encoding that is both grammatical and possible to articulate with ease. These issues are made even more complex when it is necessary to contrast the narrator's viewpoint from that that of one or more protagonists. An effective narrative shifts from a more global viewpoint to a focus on the perspective of a particular protagonist. A skilled narrator is able to jump smoothly from one perspective to the other, providing multiple cues of gaze, face, and posture to track varying perspectives. The ability to use "classifiers" correctly and effectively places demands on the child's skill in managing three types of perspective shifts: negotiating the narrator's multiple perspectives, shifting between narrator and protagonist, and moving among different protagonists.

Shifts in Narrator's Perspective. An important part of this learning task is the ability of the signer to anticipate the perspective that provides the necessary phonological latitude for incorporating the appropriate components and maximizing the number of usable "classifiers" to select. This must be done without adding on extraneous components. Young signers around age 5 may have difficulty changing viewpoints, tending to stay fixed with a given perspective. The

following utterance illustrates problems of this sort. Our 5-year-old girl in example (16) narrated her desire to get to the top of the slide and go down quickly into the water.

(21) PERSPECTIVE CHOICE [DD, ASL, 5;0]

Utterance: Child has retained flat-B-handshape (vertical plane) from previous utterance and signs "ME WANT"; then moves V-handshape upward in an upside-down posture, flips it, and descends rapidly in an arc over nondominant hand toward self.

Transcription: `(located)-~pm'PL_VL PNT_1 WANT (stand)-~pm'PL-VL-pm'TL*-ori'INV-loc'FRO_PL_VL* (ascend_descend)-~pm'PL_VL-pm'TL*-~ori'INV-~src'FRO_PL_VL*-pth'A_UD-gol'BAC_PL_VL-mod'RAP [*] .`
`%err: TL $hs = TBL ; FRO_PL-VL $loc = BAC_PL-VL`

She takes the perspective of watching herself going down the slide. The phonological constraints arising from this perspective may have led her to a compensatory solution requiring the addition of extraneous components of posture and movement, pivoting the V-handshape (two-legs) into an upside-down orientation. In the previous utterance, she had established the ground (`pm'PL_VL`) as the wall of the pool, in introducing the topic of the slide. She clings to the ground in order to continue the topic of swimming and sliding; however, maintaining the ground prevents her from choosing a different perspective, which would have allowed her to create a more grammatical utterance. Thus the poorly formed utterance in (21) seems to result from her inability to maintain the topic without dropping the ground in order to shift to a different perspective. As the child comes to appreciate the importance of shifting to different perspectives while maintaining topic, she will gain flexibility in substituting the ground components in polycomponential signs.

Shifts Between Perspectives of Narrator and Several Protagonists. The child must also learn how to describe an event from the perspectives of multiple characters within a narrative. Here we return to the 12-year-old narration of *Good Dog Carl* presented in (19) and (20). The narrator took his own perspective in (20), viewing the baby going down the laundry chute; and then he quickly shifted to the baby's perspective. The following example shows a shift between two protagonists, the baby and the dog that is caring for him. In the picture, the dog is holding a blow-dryer in its mouth and is blowing the baby dry after a bath. The narrator presents this single event from the perspective of the dog, and then that of the baby.

(22) PERSPECTIVE CHOICE [DH, ASL, 12;2]

Utterance: Child role shifts into dog, holding gun-handshape in mouth between teeth; then role shifts into baby and waves both hands in 5-handshape directed at self at either side of face.

Transcription: `` `RS(dog) (blow_dry)-pm'MOUTH'B-pm'GUN-loc'MOUTH_INT'B* [*] . `RS(baby) (be_blown)-pm'AIR-gol'FACE'B-asp'ITR^aff'SURPRISE . ``
`%err: loc'MOUTH_INT'B $loc = loc'MOUTH_FRO_EDG'B`

Note that the perspectives of the dog and baby are presented sequentially, although this is a single simultaneous event in the story. With the change in point of view the selection of the "classifier" handshape must match the perspective of the character represented. This narrator correctly articulates the positions and directions of the handshapes in order to align them with the appro-

priate protagonist. Such flexibility in the selection of "classifiers" to illuminate different points of view within a narrative is the mark of a competent signer.

TOWARD A REFORMULATION

Although we have presented this collection of discourse-pragmatic issues separately, it should be evident that they are tightly interrelated. Considerations of discourse reinforce the need to reformulate the role of "classifiers" in sign languages. In order to establish reference, specify ground, and shift perspectives, the signer must command an array of "classifiers," flexibly transferring a "classifier" from one hand to another, or flexibly replacing one "classifier" with another while maintaining reference. The two hands must function together to allow the addressee to successfully track figure and ground as they change through the course of dynamic event representation and changing perspectives. The signer must know when to introduce a referent with a full identifying expression (a noun or a point or a gaze) and when to refer back to it with one or another "classifier."

It is evident that these "classifiers" are performing a major function in facilitating fluent discourse. They do not serve simply to track referents in discourse, because referents are also subject to various ***construals***. Perhaps it is most useful to think of "classifiers" as helping to "triangulate on a referent"—to use David Wilkins' felicitous term (personal communication, 2000). The "classifier" is a component of a construction that refers to a whole event. The various components function, in concert, to triangulate on an event, from a particular point of view. But the primary role of the property marking handshape is certainly not to classify. The fact that a referent property is used to evoke an entity in discourse does not mean that the entity is being presented as a member of a particular "class." What is demanded of the learner—and the producer and receiver—is to attend to those properties that (a) are conventionally expressed in the language, and (b) are appropriate in the expression of particular event construals. We hope that considerations such as these will contribute to a more adequate designation of this vital component of polycomponential signs.

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ENDNOTES

[1] BTS can be accessed as part of CHILDES (Child Language Data Exchange System), where it is presented as Chapter 11 of The CHAT Transcription System Manual. CHILDES can be accessed on three URLs:

- In North America (organized by Brian MacWhinney at Carnegie Mellon University, Pittsburgh, PA): http://childes.psy.cmu.edu
- In Europe (organized by Steven Gillis in Antwerp, Belgium): http://atila-www.uia.ac.be/childes
- In Japan (organized by Hidetosi Sirai in Chukyo): http://jchat.sccs.chukyo-u.ac.jp/CHILDES/pdf/CHAT.pdf

The Manual has been published both as a book and a CD-ROM (MacWhinney, 2000). Updated versions and ongoing discussions of BTS transcription can be found on a website established by Brenda Schick: www.colorado.edu/slhs/btsweb. The rationale for BTS can be found in an article in *Sign Language & Linguistics* (Slobin et al., 2001).

[2] For convenience, on the assumption that our readers are familiar with one or more sign languages, we use upper-case glosses as a shorthand, though we eschew such notation in our own work with BTS. Our presentation of examples from the data is discursive, using recognizable descriptions of handshapes and movements, along with BTS transcriptions.

[3] In our Berkeley group there are three native ASL signers: Marlon Kuntze, who is deaf, and Jennie Pyers and Helen Thumann, who are CODAs (hearing offspring of deaf parents: "child of deaf adult"). In the Netherlands, Nini Hoiting works with several native SLN-signing deaf colleagues at the Royal Institute for the Deaf, "H. D. Guyot," in Haren: Bottie Reitsma, Annemarie Terpstra, and Diny Visch, who are deaf, and Ari Terpstra, who is a CODA. We are grateful for the linguistic insights and expert advice of all of these collaborators.

[4] Morford, Singleton, and Goldin-Meadow (1995) did attend to handshape classifiers; but they, too, conclude "that native signing children do not exploit the iconicity in signs to aid them in their mastery of the language" (p. 317). They used Supalla's films of motion events, and found that children made errors that either increased or decreased iconicity. However, both types of "errors" show reliance on iconicity (e.g., representing a bird in metonymic fashion, using the part of the BIRD sign that represents the beak; representing a round, lumpy frog with a C-handshape). They seem to restrict "iconicity" to a detailed mimetic depiction. Thus we do not agree with their conclusion that native ASL-signing children "do not [have] a strategy to produce handshapes that resemble their referents iconically" (p. 319).

[5] The ASL data were gathered by Reyna Lindert as part of her PhD dissertation at the University of California, Berkeley. Deaf children between the ages of 2;1 and 3;8 participated in a spatial language comprehension task that included their mothers (three hearing, two nonnative deaf) and a native ASL-using deaf assistant. The adults were asked to furnish the children with a description of a series of photographs depicting dolls and dollhouse furniture arranged in a variety of ways. Relying only on the adults' descriptions, the children were asked to use a set of dolls and dollhouse furniture to set up the toys to match what had been described to them. The ASL examples presented here are drawn from this task, as well as naturalistic activities (playing with toys, book reading, etc.). The SLN data were gathered by Nini Hoiting as part of the parental guidance program of the Royal Institute for the Deaf, "H. D. Guyot," in Haren, Netherlands. Children were videotaped regularly, at home and in preschool (18–36 months), in naturalistic activities. Examples presented here are drawn from home videos. Full presentations of the data will appear in dissertations and papers.

[6] In normal BTS format, various dependent tiers, following the transcription line, provide information about phonology, context, interpretive comments, etc. Such tiers are generally not presented here; however, the line labeled Utterance in our examples often provides such ancillary information.

[7] The vehicle-handshape in SLN is a closed-5. Note that here the closed-5 could be interpreted as either designating the vehicle or its top (or, most likely, both—without distinction).

[8] In this task, descriptions of object arrays were elicited from parents, and children's comprehension of those descriptions was assessed.

[9] Similar findings are reported for Italian and American hearing infants (Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979; Caselli, 1983; Caselli & Voltara, 1990; Volterra, 1981, 1987; Volterra & Caselli, 1985; Volterra & Iverson, 1995).

[10] The preschool data were filmed and analyzed by Marlon Kuntze. The school-age data were gathered by Philip Prinz and Michael Strong, as part of their ASL competence test; they are being transcribed and analyzed by Michelle Anthony as part of her doctoral dissertation research.

[11] Note that this transcription introduces a novel feature, not present in the preschool examples, in that the path is metaphorical (tracing the extent of the color), rather than literal movement of a figure.

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14

The Development of Reference Switching Encoded Through Body Classifiers in British Sign Language

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In this chapter, we discuss body classifiers (Supalla, 1986, 1990) in relation to children's development of complex sentences in British Sign Language (BSL), and contrast them with instrumental, size-and-shape specifier's, handling classifiers, and body-part classifiers, which we term common classifiers. We briefly describe the developmental literature on common classifiers before turning to a description of body classifiers.

We argue that, unlike common classifiers, body classifiers do not combine with movement morphemes, but instead use the body to represent a location. Body-part morphemes, which can combine with movement morphemes, are considered as variants of handling/instrumental classifiers.

In BSL, body classifiers appear with a specific set of two-part verb constructions, which make use of a switch between the perspective of two referents, where the agent and patient are not co-referential. The second part of this construction encodes the shift, using what has been called a *body classifier* in the literature and that we here propose to call a *body location*. The shift is present even where the agent and patient are co-referential, where a backward movement of the signer's body or head signals the patient role. We describe how this construction poses specific problems for children acquiring BSL related to the demands of reference marking and switching.

Developmental data from 30 native and near-native signing children aged 3 to12 years, and control data from 12 adult native signers is reported. We argue that a developmental trend in comprehension, as well as developmental errors in production, parallel previous studies of the development of verb agreement morphology, using locations in sign space (Meier, 1982). Body classifiers appear in young children's attempts to map reference shift through verb agreement;

however, at this early stage, they represent examples of overgeneralization of verb argument structure. The developmental data support earlier work by us, which has described the importance of body classifiers in referential frameworks (Morgan, 1996, 1998; Morgan, Herman, and Woll (2001). The data also provide support for other approaches that have sought to separate body classifiers from other classifiers (Schick, 1990, reference location; Engberg-Pedersen 1995, reference projection).

CLASSIFIERS AND SIGN LANGUAGE DEVELOPMENT

The term classifier stems from a set of constructions in some spoken languages (e.g., Malay, Vietnamese, and Tzeltal; cf. Craig, 1986) and refers to a set of specialized grammatical words that form constituents with certain types of noun phrases. The choice of classifier is determined by the semantic characteristics of the head noun (Trask, 1993). There is a great deal of debate on the status of classifiers in sign languages (cf. this volume). Apart from body classifiers, the term is used to refer to a system of handshapes that combine with movement morphemes in movement and location verb predicates. The linguistic description of these constructions and whether they are polymorphemic (Supalla 1986, 1990), multicomponential (Slobin et al., chap. 13, this volume) or constructed from gesture and sign blends (Liddell, chap. 9, this volume) is the subject of ongoing debate.

Different types of classifiers have been described (see Supalla 1986, 1990, Sutton-Spence & Woll, 1999):

1. Object or semantic classifiers (e.g., in BSL a G-handshape can represent PERSON, PENCIL, TOOTHBRUSH or TUBE-TRAIN)
2. Handling / instrument classifiers show the configuration of the hand as it moves or uses an object or part of an object (e.g., an Ô-hand-shape can refer to (holding) a sheet of paper.
3. Size and shape specifiers (SASS) / extension classifiers trace the shape of an object and include handshapes used to represent surface areas (e.g., a B-hand-shape may refer to the flat surface of a sheet of paper).
4. Body and body part classifiers refer to whole bodies or their parts (e.g., legs, teeth).

The use of the common classifiers (1 to 3 above) has been well described. For example, signers often refer back to a noun phrase signed previously, using a classifier handshape that represents the salient properties of a class of referents to which the noun belongs (Neidle et al., 2000: shape, semantic class, physical characteristics, or nature of the motion event). When no noun phrase precedes the classifier, the context may suffice (e.g., using the G-hand-shape to refer to an unidentified person (= someone). The particular handshapes used to represent classes of objects differ among signed languages. For example, BSL signers use a B-hand-shape with palm facing down for cars and other vehicles, whereas ASL signers use a 3-hand-shape with palm facing sideways to refer to the same class.

The Body Classifier

In early work on classifiers in ASL (Padden, 1981, 1983; Supalla, 1986, 1990) the use of the signer's own body to represent the whole body of another referent was termed a body classifier

(B-Cl). Supalla uses the verb HIT-IN-THE-EYE as an example (Supalla, 1986). The signer directs a closed-fist hand toward his own face to describe the action of hitting someone in the eye. Importantly the signer uses the eye area of his own body to represent the affected location of the patient. The hitting action is encoded through the closed-fist hand. The latter was categorized by Supalla as a body-part classifier, but is better seen as a subset of handling classifiers where no object is handled (cf. punch someone in the eye vs. hit someone in the eye with a rock).

Supalla argued that the B-Cl was different in form and function from manually articulated common classifiers: the B-Cl classifies nouns using the whole body rather than only the hand; and the nature of the representation differs because a B-Cl can only represent a body, not some semantically or visually similar referent.

> There is only one type of classifier that is physically marked with the whole body of the signer. In this case, the body articulator is used to refer to animate objects having bodies and limbs (that is a body classifier). This classifier is a kind of mimetic representation rather than a visual-geometric representation of the noun. (Supalla, 1986, p. 3)

Supalla (1986) proposed several restrictions on the use of the B-Cl in ASL:

a. They are only used with animate referents,

b. they can refer to only one object referent at a time,

c. they can combine with manner but not path morphemes, and

d. they are not used as locative markers.

The example used by Supalla (1986) to illustrate the B-Cl (unless interpreted as a reflexive HIT-SELF-IN-EYE) represents two referents in the predicate (i.e., the hitter, and the person hit). The agentive role may be left empty as in a passive verb (e.g., 'got hit by someone') or it may be independently represented by a verb inflected to agree with two locations in sign space, as in examples (1a) and (1b).

(1) a. JOHN HIT-(EYE) MARY EYE-HIT
agent object patient object

'John hit Mary in the eye'.

b. JOHN WASH-(FACE) MARY FACE-WASHED
agent object patient object

'John washed Mary's face'.

We describe the use of sign space in more detail in the section beginning on page 298.

Supalla (1986) mentioned that the B-Cl, in contrast to common classifiers, can be used to mark subject and object agreement, but does not go into more detail. He introduces the concept of a locative grid that covers the signer's body, with a set of accompanying restrictions that appear to be the same as those operating on the use of agreement markers. If a location on the signer's own body is used for reference (e.g., 'Mary's face'), the same location cannot refer to a different referent unless the location is shifted through reference shift. In a similar way, a single location in sign space off the body, if used to refer to two different referents, creates a reference

violation unless that location is part of an utterance involving referential shift (Bellugi, van Hoek, Lillo-Martin, & O'Grady, 1989; Bellugi, Lillo-Martin, O'Grady, & van Hoek, 1990). McDonnell (1996) argued that B-Cls in Irish Sign Language can be best understood as plain verbs. McDonnell describes the body as a location marker, which combines with other verb stems to mark specific locations on the body. In McDonnell's analysis, the signer's own body is the subordinate articulator, which acts as a location map for the end-point of the movement made by the dominant articulator.

Much research has focused on the typology of common classifiers in which handshape describes the class of referent (e.g., Edmondson, 1990; Wallin, 1996). In comparison, the B-Cl has received much less attention. In general they are discussed not in terms of their function as classifiers but in relation to referential shift (e.g., Engberg-Pedersen, 1995) and role play (e.g., Lentz 1986; Loew 1983). Because the B-Cl can appear at the sentential, rather than discourse level (see [1] above), the term referential shift rather than role-shift/role play is a more appropriate term to use. Brennan (1990) excludes the B-Cl from the description of the BSL classifier system, arguing that there is little evidence that this construction is comparable to common classifiers and that it should be described as referential shift. In the same vein, Aarons and Morgan (2000) explored the interaction between classifiers and syntax in South African Sign Language and argued that the B-Cl functions as a marker of referential shift.

Despite this dispute about whether B-Cls are classifiers, the term is still used regularly (e.g., Rayman, 1999; Taub, 2000). A quote from Rayman illustrates how the term classifier is used indiscriminately to describe several features of signed language: 'The classifier system provides a range of categorical representations that reveal the size and shape of an object, the semantic category of an object, *the bodily animation of a character*, the body parts of a character, or how an instrument is manipulated' (Rayman, 1999, p. 65, italics added). Data from children's development of the classifier system may be important in revealing the linguistic structure and function of classifiers and the status of B-Cls. In the following section, we summarize previous research on children's development of common classifiers, and the development of reference switching devices including those which resemble the B-Cl.

Children's Development of Common Classifiers

Studies of the development of classifiers in native signing children have concentrated on the set of common classifiers rather than the body classifier (e.g., Kantor, 1980; Schick, 1990; Supalla, 1982). Developmental data are incomplete but in general suggest that the classifier system is organized in a comparable way to complex morphological systems in other languages.

A prolonged developmental timetable has been described in children acquiring the ASL classifier system. Deaf children of deaf signing parents were reported to start using the ASL common classifier system from 4;6, although initially with errors (Schick, 1990). The handshape selected to represent the figure is generally semantically appropriate, although there are frequent omissions of ground handshapes (e.g., the B-handshape representing a TABLE-SURFACE is omitted in CUP-ON-TABLE). Any difficulties in selecting appropriate classifiers disappear by the age of 5 to 6 years but the complex syntactic environments within which classifiers appear (verbs of motion and location) cause specific problems for the child. Schick (1990), like Wallin (1996) and others, views verbs of motion and location as polymorphemic constructions comprising handshape, location, and movement roots that are articulated in syntactic space. The child ultimately acquires an abstract set of semantic categories with mappings to grammatical morphemes with which he or she can comprehend and productively use classifiers.

Slobin and colleagues (chap. 13, this volume) avoid classifying units as morphemic in order not to create an a priori classification of the child's developing grammar. Instead, although they break classifiers down into units of handshape, location, and movement, they treat them as meaning units. Slobin et al. report relatively early use of size and shape specifiers and attribute this to the consistency of categorization of form, and function.

The Development of Classifiers in Discourse

Several studies have looked at children's use of classifiers in discourse. The distribution and role of different types of classifiers in signed discourse is very clear. In Morgan (1998), reference forms appearing in narratives were coded for whether they introduced, reintroduced, or maintained reference to a character.

In adult signed discourse, nearly, one third (31%) of the total number of tokens of reference maintenance was through object/semantic classifiers, although only 4% of the total number of reference introductions was through this classifier. The object/semantic classifier is important therefore for reference maintenance and to report old or already talked about information.

This contrasts with the use of the same type of classifier in the same narratives produced by 12 deaf native and near-native signing children ages 4- to 13-years old (see Fig. 14.1). The youngest children (4- to 6-year-olds) used the form markedly less for maintenance than the adult signers (12.5% of total reference maintainers); this use increased with age (20% for 7- to 10-year-olds, and 24% for the 11- to 13-year-old group). Conversely, the youngest children were twice as likely to choose the object/semantic classifiers to introduce referents as the adults were (8% of introductions in 4- to 6-year olds compared to 4% in adult narratives).

Apart from the object/semantic classifier, the other reference form used for maintenance was reference shift. In the same study, the use of reference shift was coded for the above discourse functions of introduction, reintroduction, and maintenance of reference. This use of the signer's

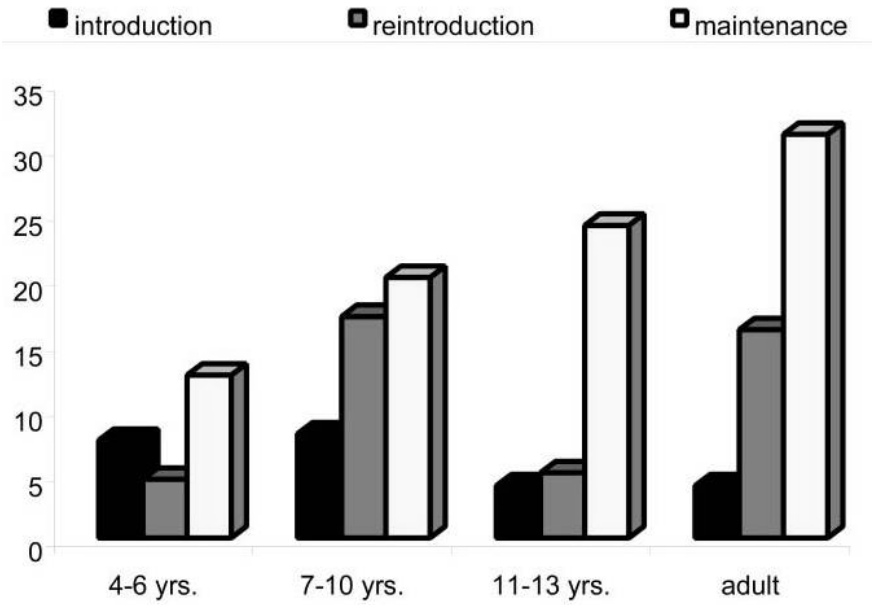

FIG. 14.1. Adult and children's use of object/semantic classifiers as a percentage of total number of reference forms across each referent funtion.

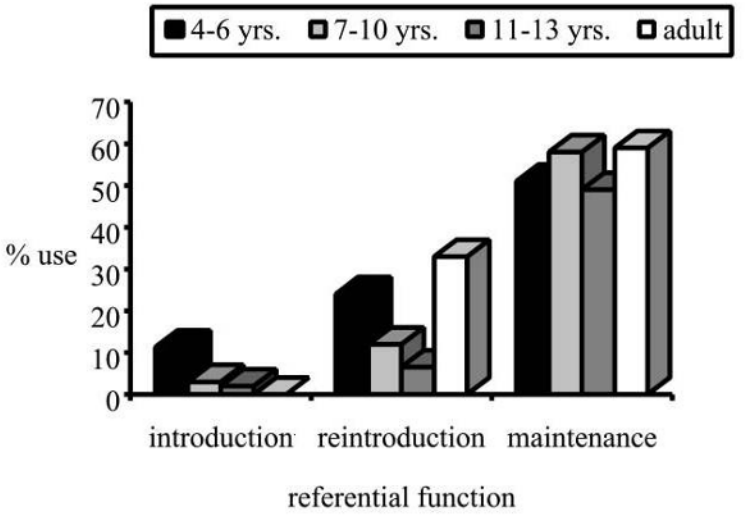

FIG. 14.2. Adult and children's use of reference shift as a percentage of total number of reference forms for each referential function.

own body for referential purposes relates to the earlier discussion of the B-Cl. Reference shift to refer to a character follows a similar functional distribution to that for classifiers. This is shown in Fig. 14.2. Across all age groups, it was used most predominantly for maintenance (59% of total reference maintainers in the adults). None of the adult narratives included referential shift for introduction of referents, whereas in the 4- to 6-year-old group, a significant percentage of reference introductions (11.25%) were made through reference shift. This was often the cause of referential ambiguity, as the form does not carry enough referential information to serve this function.

Control of the pragmatic role of the object/semantic classifier and referential shift in discourse is gradually developed with initial mastery at the sentential level, where young children may use these constructions correctly but fail to use them appropriately in relation to their referential function in discourse.

Children's Development of Body Classifiers

The B-Cl primarily functions in contexts of referential shift, where the signer uses his or her own body to refer to a shifted first person. Several studies have described children's development of referential shift (e.g., Bellugi et al., 1989, 1990; van Hoek, Norman, & O'Grady-Batch, 1987). These developmental studies indicate that the shift between two referents when mapped out using a B-Cl is easier for children to produce when it occurs between sentences, whereas a shift between roles within a single sentence appears to cause more problems. To place the discussion of developmental data on referential shift in context, it is necessary to describe how signers use sign space for verb agreement.

USING SPACE ON AND OFF THE BODY FOR VERB AGREEMENT

Previous work on the acquisition of spatial aspects of sign language grammar (especially Bellugi et al., 1989, 1990; van Hoek et al., 1987) explored the concept of *referential frameworks.* These are

sets of related locations, which stand for referents in the discourse. These frameworks are overlaid on different types of sign space. One type of sign space is a 2D, semicircular zone in front of a signer (the fixed referential framework; FRF); the other incorporates the signer's own body and locations related to the orientation of the signer's body the shifted referential framework; SRF).

The FRF uses locations in sign space, previously established through noun phrase (NP) indexing. Agreement verbs are moved between these locations in sign space to encode subject and object arguments. These locations can be pointed to for pronominal reference. The FRF can also be used as a map on which signers position and move common classifiers (such as those representing people, animals, buildings, plants, and vehicles).

In the SRF, signers encode morphosyntactic information through locations on their own bodies and onto locations related to the orientation of their bodies (e.g., Engberg-Pedersen, 1995). The movement of verbs away from or toward a signer's body indicates agreement with subject and object. If a location in front of the signer is assigned to a third person, movement toward or from the projected referent is possible. These options are shown in example (2).[1]

The verb TELEPHONE moves from the space in front of the signer (subscript j) assigned to 'three people' (the subject of the sentence), towards her own body (subscript 1).

(2) TODAY THREE-CL-G-PERSON$_j$ $_j$TELEPHONE$_1$++

'today three people telephoned me'.

AB Verb Constructions

When describing pictures (see Fig. 14.3a) that show events such as 'the girl paints the boy's face', 'the girl combs the other girl's hair', or 'the boy puts a hat on the snowman's head', adult BSL signers use a paired construction, with an agreement verb moving away from the signer's body (girl paints); (Verb A) followed immediately by the same verb moving toward the signer's body with a B-Cl (boy painted on the face); (Verb B). Hence we refer to this construction as an AB verb. In the A part the verb describes the action of the 'painting', 'combing', or 'putting'. The B part incorporates a B-Cl with the location on the signer's body representing the patient's affected body part (e.g., 'the boy's face', 'the other girl's hair' or 'the snowman's head'). An example is glossed in Fig. 14.3a and shown in selected video stills in Fig. 14.3b.

When describing how an action is directed onto a specific body part of a referent, there is a reference shift between the representation of the agent's action with the A verb (3b.iii) and the representation of the affected referent through the B part of the verb construction, coupled with a B-Cl (still 14.3b.iv) mapped onto the signer's own body.

These forms are similar to the serial or double verbs described in SLN by Bos (1996). The main difference is that in the AB verb construction, a single agreement verb appears in two different forms, with part of the agreement carried on each form, while serial verbs have been said to be made up of one agreement verb and one nonagreement verb (Bos, 1996). The AB verb construction also resembles what Fischer and Janis (1990) termed verb sandwiches, where the first verb appears in citation form, and the second verb carries the agreement information. In all three types of verbs, information about the agent and patient of a single action is carried across two adjacent verb forms.

In summary, in AB verbs in BSL, signers use a SRF, with the A form encoding agent and action; and the B form, with referential shift and a B-Cl, encoding the specific location of the action on the patient's body.

(14.3a)

>< >> ØØ <<

GIRL BOY-PERSON-LEFT PUNCH GET-PUNCHED

‘The girl punched the boy in the face’.

14.3b.i 14.3b.ii 14.3b.iii 14.3b.iv

GIRL BOY-PERSON-LEFT PUNCH GET-PUNCHED

‘the girl punched the boy in the face’.

FIG. 14.3. (a) An AB verb with nonmanual markers and inflections in sign space indicated, (b) video stills of an AB verb.

Children’s Development of Agreement Verbs with and without Body Classifiers

Children initially mark agreement on signs with present referents. The initial use of locations in the SRF for reference to nonpresent third persons is errorful, with inflection at the same location for more than one referent in a single sentence, or inconsistent cohesion at the discourse level (e.g., Meier, 1981, 1982; Morgan, 1996, 1998). Few studies have described children’s use of B-Cl at the sentence rather than discourse level. For the most part, research has focused on the use of role play in narrative discourse (Bellugi et al., 1989; Loew, 1983).

Attempts by young children to use AB verb constructions result in interesting morphological innovations. In Bellugi et al. (1990), children acquiring ASL were asked to describe a picture showing a boy painting a girl’s face. One child (<5;0) was reported as signing PAINT-FACE on both sides of her own face to encode the shift between two perspectives.

In a previous set of case studies of children acquiring BSL, AB verbs appeared around 5;0 to 6;0 with regular errors in the use of verb agreement incorporating B-Cls (Morgan, 1996, 1998) specifically omitting one part of the verb pair. Young children sign the B-part of the AB verb with direct object agreement but without the A-part of the verb. An example from a child aged 5;6 is shown in (4):

(4) ØØ no referential shift

$GIRL_j$ $PAINT\text{-}FACE_j$ BOY_k $PAINT\text{-}FACE_k$

‘the girl paints her face the boy paints his face’.
(intended meaning: “the girl paints the boy’s face; the boy paints the girl’s face.”)

In order to explore whether these errors represented a general stage in the development of spatial syntax, we analysed data collected from a large sample of children acquiring BSL. In the following section, these data are presented and explanations suggested for the error patterns found.

Comprehension and Production Group Study

In Morgan et al. (2001), we reported on a study specifically looking at the development of complex verb agreement in BSL by reanalysing previously collected data from Herman and Woll (1998). The Herman and Woll data comprised both sentence comprehension (C) and elicited sentence production (P). Comprehension scores were collected in a sign language to picture matching task. Subjects watched an adult signer on video produce a sentence with an AB verb and were then asked to point to the matching picture out of a set of four. Sign production was elicited by asking the child to sign a sentence using similar picture stimuli (Fig. 14.4a & Fig. 14.4b).

This study confirmed that children under 5 years use only the B part of the AB verb. A summary of the findings is presented below.

Subjects

Data came from 30 native signing children. All the children had parents who were fluent in BSL. Twenty-seven (90%) of the children had deaf parents. The other three children had hearing parents who used BSL at home or work. For example, one hearing mother was a qualified BSL interpreter and worked in a deaf school. No differences were found between the children on an

FIG. 14.4a. Picture stimulus used in P-AB. (© Human, Holmes, & Woll, 1999)

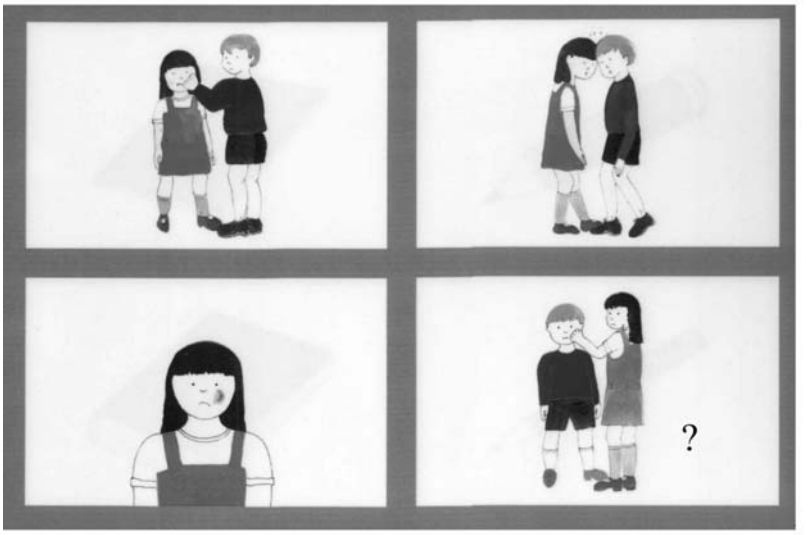

FIG. 14.4b. Picture stimulus used in C-AB. (© Human, Holmes, & Woll, 1999)

TABLE 14.1

Sample description

	Group 1	*Group 2*	*Group 3*
N	10	10	10
Age range	3;0–5;1 mean = 4;9	6;0–8;11 mean = 6;11	9;0–12;0 mean = 9;4
Male/Female	3M/7F	7M/3F	2M/8F
Child/Family hearing status (D)eaf/(H)earing	8 D/D* 1 H/D 1 D/H	7 D/D 1 D/D 2 D/H	9 D/D 1 H/D

*D/D–deaf chilld/deaf parents; H/D–hearing chld/deaf parents; D/H–deaf child/hearing parents

analysis of their performance on comprehension and production of 40 sign sentences from a standardized test of BSL morphology and syntax (Herman, Holmes, & Woll, 1999). Subjects were divided into three age groups. Group sizes, age ranges and child and parental hearing status are shown in Table 14.1.

The same comprehension and production tasks were undertaken with 12 adult native signers, as controls.

Three tasks were analysed for all subjects: (1) Comprehension of a sentence containing an AB verb (C-AB); (2) Production from a stimulus picture of a sentence requiring an agreement verb (P-agreement); and (3) Production from a stimulus picture of a sentence requiring an AB verb (P-AB). The stimulus picture requiring an agreement verb is of an adult handing a book to a child. The picture requiring an AB verb depicts two children playing in the bath; the older boy is washing the younger boy's face (see Fig. 14.4a). When describing this picture, all 12 adult signers produced an AB construction.

Results

Comprehension of the AB verb construction shows a clear increase with age. Correct selection of the target picture was made by 40% of the youngest group, 70% of the middle group, and 90% of the oldest group (χ_2 =11.6, *df* = 2, $p < 0.003$). In the youngest age group, 5 of the 6 errors consisted of the child selecting a picture that showed a boy pouring water on his own head (i.e., the AB verb interpreted with reflexive meaning).

In the production data, clear developmental trends were observed. The sentence requiring a single agreement verb (P-agreement) with no B-Cl, was produced correctly at an earlier age than the AB type. Performance across the three child age groups was 60% correct for the youngest, 80% correct for the middle, and 100% correct for the oldest age group.

In the more complex AB sentence production task (P-AB) requiring an agreement verb and B-Cl, production improved over age but was mastered comparatively later, with 0% of the youngest children, 40% of the middle age group, and 70% of the oldest age group correctly producing the AB target, still below the score of the adult controls.

There was a strong preference among the youngest children for use of only the B part of the verb, replicating the findings of the earlier studies (Morgan, 1996, 1998). Across the three groups, some form of the B part only was found with 90% of the youngest children, 40% of the middle group, and only 10% of the oldest children (χ_2 = 13.3, *df* = 2, $p < 0.001$).

To summarise, the majority of the youngest children failed both comprehension and production of the AB verb sentence, whereas older children improved in comprehension of the sentences involving B-Cls used to express agreement, but still had difficulties in producing the same structure in their own signing. Even the oldest children had problems with the use of a B-Cl with an AB verb. In the youngest children, before mastery of this structure, there was a strong preference to use the B part of the verb with the B-Cl.

It might be thought that the cognitive complexity of the B form is greater, because two referents are represented simultaneously, with the body of the signer representing the patient's body, and the hand of the signer representing the agent's hand. However, the data confirm that the B form alone is preferred in production to map out the complex AB verb meaning (within-sentence shift using SRF), even where comprehension of AB forms is good.

Two reasons are suggested for the preference in young signers for the use of the B-Cl/ B verb form. The first is the earlier development of agreement where a physical agreement point is available. In the B part of the verb, the signer's own body can be used as an agreement point, whereas it is not available in the A part. In addition, object agreement is more frequently marked than subject agreement in BSL verbs generally, and only the B verb permits object agreement. Without the A part however, the appearance of the B verb form with the B-Cl is interpreted by adults as a reflexive (e.g., 'he washes himself'). We argue that the youngest children are producing a transitive verb with a two-place argument structure. Rather than spread the three arguments (subject, indirect object, and affected location) across two verbs, children attempt to encode this meaning in the canonical verb frame used in the SRF. This overgeneralization allows a complex structure to be encoded but in an unadultlike way.

Children understand the agreement relations expressed through the B-Cl before they are able to produce coordinated agreement verb and B-Cl constructions. Their errors are similar to the ambiguous forms they produce with locations in the FRF (Bellugi et al., 1989; Loew, 1983; Meier, 1981, 1982; Morgan, 1996, 1998). The linguistic demands of the B-Cl form, in particular the complexity that combining B-Cl with agreement locations makes on children's developing linguistic system, is responsible for the late mastery of the AB verb structure.

CONCLUSIONS

In exploring the function of the B-Cl, data from first-language acquisition suggests they are intimately involved in reference shift. The B-Cl does not appear to be used for noun classification but rather describes a complex referential shift in a reduced syntactic form. The recategorisation of the B-Cl, a form that is attested in several sign languages, is part of the current process of reexamination of classifier typology. By recategorizing B-Cls as outside classifier typology, a more cohesive group of classifiers, which share common properties and functions, remains. The B-Cl may be more appropriately renamed as the B-Loc (Body Location) to indicate its role in the referential system.

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ENDNOTES

[1] Signed sentences that appear in the text follow standard notation conventions. Signs are represented by uppercase English glosses. Repetition of signs is marked by '+'. 'IX' is a pointing sign. Semicircles represent the sign space with the flat edge nearest to the signer's perspective. Arrows indicate the direction of the agreement verb's movement. Above the glosses, eye-gaze markers such as closes (ØØ), direction (>>) and gaze toward the addressee (><) are indicated by a horizontal line across the affected segment.

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15

How Composite Is a Fall? Adults' and Children's Descriptions of Different Types of Falls in Danish Sign Language

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ALTERNATIVE ANALYSES OF CLASSIFIER CONSTRUCTIONS

From about 1980, the sign linguistics literature was dominated by analyses of sign languages in traditional linguistic morphological terms. In particular, treatments of verb agreement, verb aspect, and the so-called classifier[1] constructions in many sign languages made sign languages appear morphologically rich, and Klima and Bellugi (1979) characterized ASL as an inflecting language comparable to Latin. Up through the 1990s analyses of sign languages in traditional morphological terms came under increasing scrutiny. In contrast to Klima and Bellugi's characterization of ASL as an inflecting language, Bergman and Dahl (1994) claimed that Swedish Sign Language is "basically an inflection-less language" (p. 418), but use traditional linguistic terminology for sign modifications when they describe Swedish Sign Language as having "a very well-developed ideophonic morphology" (p. 418). The strongest attack against morphological analyses of sign modifications is Liddell's (1990, 1995, 2000) gestural analysis of the deictic elements of signs (the direction of pointing and what is traditionally called agreement). Liddell and Metzger (1998) not only described spatial modifications of signs as gestural and thus nonlinguistic, but also characterized many manual "gestures" as such (i.e., as part of a gestural code in contrast to linguistic signs or words of the sign lexicon; see also Emmorey, 1999). In their analysis, a signed message is provided by a combination of gram-

matically (i.e., linguistically) coded meaning and nongrammatically coded meaningful gesture or gestural demonstration. Another analysis of signed discourse as manifesting different types of representation of meaning can be found in Macken, Perry, and Haas (1995). They distinguish iconic from arbitrary ways of representing meaning but see ASL and presumably other sign languages as single, although heterogeneous, communication systems.

Cogill (1999), specifically analyzing classifier predicates, argued that "the fundamental controlling principle by which classifier predicates are produced and understood is not linguistic, but visual representation" (p. 1). Cogill argued that discrete units with stable relations between meaning and form are not unique to human language, but are also found in visual representation such as children's drawings and the dot art of the Western and Central Desert Aborigines of Australia. Moreover, Cogill argued that classifier constructions do not manifest duality of patterning, i.e., there is no separate organizational level of units corresponding to the phonemes of spoken languages.

Liddell's main reason for describing the use of space in sign languages as gestural is lack of discreteness in the expression, but Cogill pointed out that even the discrete parts of classifier predicates, the different handforms, are meaningfully deformable. Australian signers spontaneously "deform" the "two-legged-entity" classifier (expressed by a fist with extended middle and index fingers pointing downward in the canonical position) by curling the middle finger in descriptions of a person hopping with one leg curled. This iconic possibility was one of Cogill's main reasons for comparing classifier constructions with nonlinguistic systems of visual representation.

Liddell (chap. 9, this volume) rejects both an analysis of classifier predicates in terms of visual imagery (DeMatteo, 1977) and an analysis of such predicates as productively formed from roots and affixes (Supalla, 1982). The analysis of a sign such as PERSON-WALK-IN-UNHURRIED-MANNER (pointing hand with the index finger pointing upward) made with repeated, up-and-down movements along the path, as a visual analogue of a real-world situation cannot explain the fact that the sign means that the person walks, and not hops or skips. The sign has a lexically determined meaning, Liddell claims.[2] On the other hand, the analysis of classifier predicates as productively composed of roots and affixes cannot explain why signers reject many signs as unacceptable that are formed through a combination of morphemes from the alleged inventory of morphemes. Unacceptable signs and apparent gaps—signs that are predicted to be possible, but do not occur—are a problem to both types of analyses, but can easily be explained by way of an analysis of the signs as partly lexical units. In a lexical analysis of classifier constructions, Liddell disregards the placement of the hands and some aspects of the orientation, because these parts are based on analogy. What remains of the classifier predicates is analyzed as lexical verbs, which vary in their analyzability. Liddell analyses the lexical verb PERSON-BE-AT as consisting of two morphemes, one being the part that is traditionally described as the classifier, the other the morpheme meaning 'be located', expressed by a small "contacting" movement. Other signs are less fully analyzable, and even the two morphemes of PERSON-BE-AT do not combine freely with other morphemes.

The contrast between Cogill's and Liddell's analyses seems due primarily to the fact that Liddell concentrates on the most frequently used classifiers in predicates about commonly occurring events or what can be described as standardized descriptions. Cogill rather looks for the borderline cases, those situations where signers exploit the iconic possibilities in descriptions of more uncommon events.[3]

This chapter pursues the two ideas that (a) classifier predicates used to describe commonly occurring events are not productively formed of roots and affixes as suggested by Supalla (1982), but are lexicalized units of variable analyzability; and that (b) the iconic character of these units allows signers to construct novel forms when confronted with the task of describing unusual events. The data come from retellings by Danish deaf children and adults of the story *Frog, Where Are You?* (Mayer, 1969). The study focuses on the way the children and adults describe how someone or something falls down and asks the following questions:

1. How much consensus is there among the adult signers?
2. What parts of the constructions are analogical or nondiscrete in the sense that the transition point between one meaning and another cannot be determined when the expression is changed gradually?
3. Do the children organize the signs from the beginning in terms of discrete morphemes, as suggested by Supalla (1982) in his study of three children ages 3;6 to 5;11, or do the children gradually learn to analyze signs into components?

The frog story includes altogether six falls that differ in terms of the type of falling entity, the path of the falling entity in relation to the ground (vertical vs. horizontal movement), the direction of the movement in relation to the falling entity (forwards, i.e., away from the signer; or backwards, i.e., toward the signer), etc. The analysis focuses on the degree of consensus among the adult signers, the extent to which each—adult or child—signer chooses different signs for different types of fall, and the possibility of analyzing the signs as differing compositionally. As an assessment of the children's competence, it should be kept in mind that in the context of telling a story, the children are confronted with other requirements than that of making linguistic constructions, including classifier constructions (see also Kantor, 1980, on the influence of semantic and syntactic complexity on children's classifier use). In particular, the children are expected to tell a coherent story (see further, Berman & Slobin, 1994).

After a presentation of the subjects and the elements of the analysis, I present an analysis of the adult signs and from there proceed to an analysis of the children's signs.

SUBJECTS

The data were elicited as narrations of the wordless picture book *Frog, Where Are You?* (Mayer, 1969) from 16 children between the ages of 6;6 and 9;3 at the School for the Deaf in Copenhagen and from four deaf adults. Four of the 16 children were recorded twice with an interval of 1 year, 4 months between recordings, which gives altogether 20 child stories. Two children and all the adult signers have deaf parents, and one child, who was recorded twice, has an older deaf brother. All the other children have hearing parents.[4] The number of years that each child has attended a preschool with signing deaf adults before entering school at approximately age 6 appears in Table 15.1.

The recordings of the children were made at the school and, in the case of the youngest children, at their daycare institution. The children were instructed by a deaf signer whom they knew well. The instructions were a translation into Danish Sign Language from the instructions found in Berman and Slobin (1994, p. 22). The children were told that the book is about a boy, his dog, and his frog. They were asked to look first at all the pictures and afterward tell the story. They were allowed to go through the book again while telling the story.

TABLE 15.1

The Children's Family Background and the Number of Years They Have Attended Preschool with Deaf Signing Adults Before Entering School at Approximately the Age of 6.*

	Family	*Number of Years in Preschool with Deaf Adults Before School*
B6;6	hearing	3
G6;6	hearing	4
G6;7	deaf older brother	4
B6;9	hearing	4
B6;10	hearing	4
B6;10	hearing	4
B6;11	hearing	2 ½
G6;11	hearing	5
B7;0	hearing	3 ½
B7;6	hearing	4
G7;8	hearing	2
B7;11 (= B6;6)	hearing	3
G7;11 (= G6;7)	deaf older brother	4
B8;0	hearing	4
B8;3 (= B6;10)	hearing	4
G8;4 (= G6;11)	hearing	5
B8;10	deaf parents	not known
G9;2	deaf parents	not known
B9;3	hearing	not known
G9;3	hearing	not known

* G = girl; B = boy; 9;3 = 9 years, 3 months

THE ANALYSIS

Elements of the Analysis

In *Frog, Where Are You?* there are six fall episodes:

1. The fall of a dog from a window sill to the ground;
2. the fall of a beehive from a tree to the ground;
3. a boy's fall from a tree to the ground;
4. the boy's fall from the top of a rock onto a deer's head (horizontal fall);[5]
5. the boy's fall from the deer's head into a pond; and
6. the fall of the dog from a cliff into the pond.

In the analysis of adult signs, as well as the development from child signs to adult signs, I focus on six aspects of the constructions:

1. The Figure-representing handform:[6] In a motion-denoting classifier construction, the handform of the dominant hand denotes the Figure of the motion event (Talmy, 1985). The choice of handform, the so-called classifier proper, is chosen according to semantic features of the Figure relevant to the specific motion event (Engberg-Pedersen, 1993; McDonald, 1982).
2. The Ground-representing handform: The handform of the nondominant hand in a motion-denoting classifier construction represents the Ground of the motion event.[7]
3. Loci for Grounds: Combined with or as an alternative to the use of the nondominant hand, signers may use a certain direction, a so-called locus (Engberg-Pedersen, 1993), to represent the Ground.
4. The use of the signer's head or body to represent the Ground.
5. Distinctions between the horizontal fall and the vertical falls.
6. Distinctions between the boy's s backward fall from the tree and the other falls of the boy and the dog.

Aspects 1 through 4 result from an analysis of how the Figure and the Ground of a motion event can be expressed in Danish Sign Language (Engberg-Pedersen, 1993). Aspects 5 and 6, which involve the Path, arose from the analysis of the specific signs in this study. One further aspect worth considering is the signers' use of shifted attribution of expressive elements, i.e., their use of facial expression and body posture to express a typical bodily or facial feature of a character, a character's attitude or emotions, or the signer's own attitude or emotions at a different moment in time than the speech situation (Engberg-Pedersen, 1995). All the adult signers use this feature with their fall constructions, and as a language-specific discourse requirement, it can be expected to cause children problems (see also Reilly, McIntire, & Bellugi, 1990). As the children hardly use this feature at all, I only comment on it briefly.

The Adult Constructions

A standard sign FALL in Danish Sign Language is made with the dominant hand in the shape of a V (extended index and middle fingers), fingertips touching the palm of the nondominant flat hand held horizontally, palm up. The dominant hand is moved up, the hand rotates and is moved down such that the index and middle fingers end up in a horizontal position and their backs touch the palm of the nondominant hand. Besides the standard sign, adult signers use a form without the involvement of the nondominant hand. It can be made in the direction of the fallen entity (or a locus for it in signing space) and iconically reflect the length of the path movement.[8]

In contrast to the children, none of the adults use the standard sign with two hands in their descriptions of the fall events of the frog story. The adult norm induced by the context, i.e., retelling a story, requires semantically more specific predicates. In the analysis of the adult forms, I focus on the degree of consensus among the adult signers and the discreteness of the individual aspects of their constructions.[9]

TABLE 15.2

Classifiers Used by the Adult Signers, A, B, C, and D, for the Figure in the Six Fall Episodes.*

	Ep. 1	*Ep. 2*	*Ep. 3*	*Ep. 4*	*Ep. 5*	*Ep. 6*
Two-legged-entity	A		ABD	ABCD	ABCD	BC
"Fall-backward" (see text)			ABC			
Animal	BD					AD
Curved-entity		AB				
(2h)Curved-entity		CD				
Head-of-deerlike-animal				D		

*The individual classifiers are described in the text. The Figure elements are: episode 1: dog; episode 2: beehive; episode 3: boy; episode 4: boy (and in one signer's description the deer's head); episode 5: boy; episode 6: dog.

Classifiers. The classifiers used by the adult signers for the Figure of the six fall episodes appear in Table 15.2.

There is a high degree of consensus as regards the use of the classifier Two-legged-entity, expressed by the V-handform (a fist with the index and middle fingers extended and straight or slightly bent, fingertips downward in the canonical position) for the boy in episodes 3, 4, and 5. Moreover, three signers use their hands (loose flat hands) to represent the boy's hands in the description of his fall from the tree and all do so in episode 3. They move their hands, palms forward, backward up past their ears while leaning back.[10] According to native signers' intuition, there are two fixed signs, one is the one just described, and in the other one, the hands and the body move forward. These two signs are fixed in the sense that signers feel they constitute wholes used to describe human beings falling backward and forward respectively and can thus be transcribed as FALL-BACKWARD and FALL-FORWARD. In descriptions of episode 3, the adult signers use a construction with the Two-legged-entity classifier or FALL-BACKWARD or a sequence of the two. None of the signers use FALL-FORWARD in descriptions of the boy's fall from the deer's head into the pond—according to native signers probably because he falls into a pond. FALL-FORWARD is more likely when somebody falls onto a surface where the hands can be used to protect the body. The constructions where the hands iconically represent the boy's hands represent a different perspective on the event than the constructions with Two-legged-entity only. As the signers' body as a whole, not only their hand, represents the boy, the fall is described as a close-up.[11]

All signers also make a clear distinction between the animate entities (the boy and the dog) and the inanimate entity (the beehive). They use either Curved-entity (fingers extended, bent, and slightly spread, the thumb opposed) or (2h)Curved-entity (the curved hands held to form a cylinder) for the beehive and either Two-legged-entity or Animal (the handform of Two-legged-entity, but with the index and middle fingers curled) for the boy and the dog. The signers using the one-handed version Curved-entity for the beehive probably do so because their nondominant hand is occupied by a classifier for the tree (cf. Table 15.3). According to native signers' intuitions, Two-legged-entity and Animal tend to merge. Signer B, for example, starts and ends her construction describing episode 1, the fall of the dog from the window, with Animal, but in the course of the hand's downward movement, it changes to the form of Two-Legged-entity.

TABLE 15.3

Classifiers Used by the Adult Signers for the Ground in the Six Fall Episodes.*

	Ep. 1	*Ep. 2*	*Ep. 3*	*Ep. 4*	*Ep. 5*	*Ep. 6*
Surface	**A**		**ABD**	A**CD**	**B**	**AB**
Tree		**AB**				
Antler				A	**A**	
Head-of-deerlike-animal				B		

*The individual classifiers are described in the text. The Ground elements are: episode 1: window sill to ground; episode 2: tree to ground; episode 3: tree to ground; episode 4: rock to deer's head; episode 5: deer's head to pond; episode 6: cliff to pond. Bold face indicates that the classifier is used for the source of the fall, normal text that it is used for the goal.

There is thus a high degree of consensus among the adult signers as regards classifiers for the Figure. Moreover, by using FALL-BACKWARD in their descriptions of the boy's backward fall, three out of four signers choose the close-up perspective on episode 3.

The adult signers' use of classifiers for the Ground in the fall events appear in Table 15.3. All the adults use Surface (a loose hand, palm down; the handform often assimilates to the handform of the preceding sign, a loose 5-hand after DEER, a loose fist after DOG) to represent the source of the motion in one or more falls. The classifier Tree (forearm and flat hand with extended, spread fingers held vertically) is used by two signers in episode 2 about the fall of the beehive from a tree. The Ground is also a tree in episode 3 (the boy's fall from a tree when he is scared by the owl), but here the signers who do use a classifier for the Ground use Surface. That is, the choice of classifier for the Ground depends on the perspective taken on the fall. In the descriptions of the boy's fall from the tree, the signers use the close-up perspective (cf. their use of FALL-BACKWARD). The tree is only represented as the background for his fall. The fall of the beehive in episode 2 is described from a distant perspective. What determines the choice of classifier for the tree is not its character or the character of the Figure, but the perspective taken by the signer, because a boy's fall from a tree could be described by means of a construction with the Tree classifier, e.g., in a description of somebody seeing a boy fall down from a tree.

Only one signer uses Antler (one or two 5-hands with the tip of the thumb touching the forehead) in episodes 4 and 5 to describe the boy's getting onto the deer's head and his fall from the deer's head into the pond. Other signers use only their head to represent the deer's head (see below).

From the perspective of the degree of consensus among the signers, one episode is particularly interesting, namely the boy's movement from the rock onto the deer's head. Many signers show signs of processing problems (hesitation, false starts) in describing this episode. One of the adult signers, signer D, even combines the use of a classifier with unconventional articulators. Signer D describes how the boy ends up astride the deer by pushing her chair away from the table and moving her hand representing the deer's head (Head-of-deerlike-animal, i.e., a hand with the pads of the straight fingers touching the pad of the thumb, "tapered O") in between her own legs (cf. Table 15.2). The processing problems can be interpreted as indicating a low degree of conventionalization in the language; the signers hesitate because they are uncertain how to describe the event, and they have to draw on the creative parts of their communicative means. Episode 4 is the only episode where the signers use a classifier to represent the goal of the movement. Moreover, they show little consensus as to how to represent the deer's head as the

goal. One signer uses Surface, another uses Head-of-deerlike-animal, and two use their own head (see below).

In summary, the adult forms show consensus especially as regards classifiers denoting the Figure of the fall events. Although some variant of the standard fall sign can be used of all falling entities regardless of their character, the discourse context—telling a story based on a picture book—makes all the adults distinguish animate from inanimate entities (i.e., boy/dog vs. beehive). Three adult signers agree on choosing a close-up perspective on episode 3 by using FALL-BACKWARD, a sign that iconically represents human-beings falling backward, lifting their hands. Ground-representing classifiers are used for the source of the fall events. In descriptions of episode 4, however, two signers use a classifier for the goal. The signers use altogether three different classifiers for the deer's head, two of them, Surface and Antler, occurring both as goal representations in episode 4 and as source representations in episode 5. Signers may thus choose different perspectives on fall events. With respect to the Figure, the adult signers show consensus as to when to choose which perspective. With respect to the Ground (the deer's head), there is more variation in the choice of representation. The difference probably depends not on the difference between Figure and Ground, but on the frequency of deers' heads as grounds and boys as figures of fall events.

As mentioned, the boy's getting entangled in the deer's antlers is more difficult for the adults to describe than any of the other fall episodes, and the episode gives rise to more variation than any other episode, variation in choice of classifier for the Ground and in indicating either the source or the goal of the motion. One signer even involved her own legs as representations of the boy's legs. If the tapered-O-hand used to represent the deer's head is a linguistic element, she combined linguistic and nonlinguistic elements. Signers who use their own head to represent the deer's head must also be said to mix linguistic and nonlinguistic elements. But this combination is very frequent in signing. From a processing point of view, the signers use whatever means available that communicate the intended meaning.

Loci and the Signer's Head and Body Used to Represent the Ground. It could be expected that signers who use few Ground-denoting classifiers would instead use loci to represent the Ground. This is not the case, however. Loci play a very minor role in the fall descriptions in retellings of the frog story. Some of the signers apparently combine the Tree classifier (the forearm and 5-hand held vertically) with a locus to the right or left when they describe the beehive's fall from the tree, but it is impossible to determine whether the signers indeed use a locus to one side or whether they simply make the classifier construction in this position because it is convenient when making the classifier with their right or left hand and arm.

Signer C makes a clear distinction between signs describing the boy looking into a hole in the ground in the rightward direction and the dog running up to the tree with the beehive in the forward direction (pictures 9 and 10 in the frog story). But when she turns the page and goes on signing about the tree with the beehive in the forward direction, it is not clear that she uses a specific locus for the Ground. The forward direction only stands out as special in contrast to other directions.

A similar problem turns up in relation to the use of the signers' own head or body as representing the Ground. In episode 6, the dog falls from the cliff next to the deer who has just thrown the boy into the water. Signer D apparently uses her own head and body to represent the deer in her description of episode 6, making the articulator start over her right shoulder. She uses exactly the same construction, however, in recapitulating that both the boy and the dog fell into the water in relation to picture 18, where they are both seen in the pond. The boy did not fall from next to the

deer, but from the top of its head, and the dog fell from the cliff. Here the focus is on the goal (i.e., the water, and the exact point of the movement is irrelevant). The two forms are, however, identical even though the starting point is meaningful only in one of the contexts. The starting point of the second form is probably the result of assimilation to the previous sign.

The problem of decomposing the classifier constructions into discrete meaningful units also arises in relation to the classifier constructions used to describe the boy's fall from the deer's head. Signer D makes the hand articulating Two-legged-entity start from the back of her head, signer A from the top of her head, and signer C from her forehead. It is not likely that the signers describe the episode differently in the sense that they indicate that the boy falls from different positions on the deer's head. Rather, the signers do not find it sufficiently important to indicate exactly where the boy was positioned on the deer's head. In a different context, talking about brain injury, for instance, the different positions on the skull may be significant.

Both Ground-representing loci and positions on or in relation to the signer's head and body as representing the Ground involve use of the signing space, i.e., a means of expression that cannot be divided into discrete meaningful units (see especially Emmorey 1999; Liddell 1995, 1996). The examples demonstrate that it is often left to the recipient to infer from context whether a given position should be interpreted as meaningful. Distinctions that may be significant in some contexts are not significant in other contexts.

Vertical Versus Horizontal Versus Backward Falls. In one picture the boy is seen sitting astride a branch, and in the next he is lying on his back at the base of the tree (episode 3). He thus seems to have fallen backward down from the tree. In episode 4, the boy stands on his two feet on a rock and makes a horizontal or slightly upward movement when he looses control and moves, or is lifted, from the rock onto the deer's head. In episode 5, he is lying on top of the deer and falls from there, or is thrown, down into a pond. In episodes 1 and 6, the dog falls forward from a higher level onto the ground and into the pond.

In almost all cases, the adult signers use Two-legged-entity or Animal and change the orientation of the articulator in the movement. The differences between vertical falls and the boy's horizontal movement onto the deer's head, and between the vertical backward fall and the vertical falls are distinguished by (a) the articulator's path movement: the difference in vertical level between the articulator's starting point and its end point (the vertical downward falls vs. the horizontal fall); and (b) the articulator's direction of movement: the difference between the starting point of the articulator and its end point in relation to the signer's body (the backward fall vs. other vertical falls). Movement forward from the signer denotes forward falls or falls without focus on the orientation of the falling entity; movement inward toward the signer denotes a backward fall. [12]

The signers' choices with respect to these aspects appear in Table 15.4.[13] The table demonstrates a very high degree of consensus. In descriptions of the vertical falls, the signers use path movements with a clear difference in level between the starting point and the end point and with a change of the articulator's orientation in the course of the movement. In descriptions of episode 4, signers A, B, and C move their hand forward so that it ends up at the same level as or slightly higher (see below) than its starting point. Episode 3 differs from these falls in that the boy falls backward, not forward. All signers indicate this by moving the articulator toward their own body, but one signer, D, ends the movement at the same level as its starting point. Signer D's focus seems to be on the direction of the boy's movement rather than on the path movement.

In the descriptions of episode 4, the signers move the articulator for Two-legged-entity forward from their bodies as the boy falls forward from the rock. Only three use a horizontal path

TABLE 15.4

The Relevant Movement Aspects of the Classifier Constructions.*

	Ep. 1	*Ep. 3*	*Ep. 4*	*Ep. 5*	*Ep. 6*
Path movement					
Vertical	ABD	AB		ABCD	ABCD
Horizontal		D	ABC		
Orientation Change					
Yes	ABD	ABD	BCD	ABCD	ABCD
No			A		
Direction of movement					
Forward	ABD		ABCD	ABCD	ABCD
Backward		ABD			

*With Two-legged-entity or Animal used to describe the dog's fall from the window sill (episode 1); the boy's fall from the tree (episode 3); his "fall" from the rock onto the deer's head (episode 4); his fall from the deer's head into the pond (episode 5); and the dog's fall from the cliff into the pond (episode 6). Signer C describes episode 3 by means of FALL-BACKWARD (flat hands) only. Signer D describes episode 4 with only a change of orientation of the articulator and no path movement.

movement. Signer D changes the orientation of the articulator from contact between the fingertips and the nondominant hand (representing the rock) to fingers held horizontally. She focuses on the boy's legs, rather than on his movement from the rock onto the deer. Signer A uses Surface for the deer's head in the nondominant hand, points to a location closer to her body below the articulator for Surface (i.e., 'behind the deer'), changes the dominant articulator from the index hand for the pointing to the V-hand for Two-legged-entity without changing the orientation of the hand (i.e., the fingers are held almost vertically), and moves the hand upward into contact with the back of the nondominant hand. Her focus is on the boy's starting position (pointing to the imaginary rock behind the articulator representing the deer's head) and on his orientation at the end position (i.e., lying on the deer's head). She does not describe his loss of control by changing the articulator's orientation. Episode 4 demonstrates again that when confronted with less canonical situations of loss of balance, the signers' descriptions vary the most. Signers A and D choose different perspectives on the event, focusing on his starting position and orientation at the end position and on his legs respectively.

Adult Forms: Degree of Consensus and Discreteness of Forms. The pattern that stands out from a comparison of the adult forms is that consensus is highest as regards constructions used to describe canonical falls from a higher to a lower level. The adult signers are unanimous in using Two-legged-entity with a change in the articulator's orientation and a clear forward, downward path movement in all constructions about the boy's vertical forward falls. There is also consensus as regards the distinction between the backward and the nonbackward falls as indicated by the use of FALL-BACKWARD (iconically a representation of the boy's body and hands moving backward) or a construction where the articulator for Two-legged-entity moves toward the signer's body in descriptions of episode 3.

When we turn to less typical falls, especially the boy's movement onto the deer's head, there is less consensus. Some signers use a classifier for the source, others a classifier for the goal in contrast to all other fall descriptions. Moreover, the signers use three different classifiers for the goal. Three signers include a path movement, and one only changes the orientation of the articulator. Three signers change the orientation of the articulator, whereas one focuses only on the boy's orientation at the end of the movement.

The adult constructions demonstrate that signers may take different perspectives on a motion event. The perspective may be conventionalized as in the use of FALL-FORWARD and FALL-BACKWARD, but the constructions in this study also demonstrate that signers may make individual choices. Pragmatic irrelevance seems to be the reason why there is less consensus as regards the use of Ground-denoting than Figure-denoting classifiers. One signer uses only Surface (or nothing) for the Ground, whereas one uses three different classifiers.

Change of the articulator's orientation is part of the standard sign FALL and of all but one adult construction with Two-legged-entity or Animal. A path movement is also part of the standard sign FALL and present in all but one adult construction in the study. Two adult signers ignore the path movement or the change of orientation in descriptions of episode 4. They choose different perspectives on the event, manipulating the aspects that go into the more conventionalized constructions used for canonical falls. Thus the adult fall constructions result from two opposed tendencies, one toward conventionalization of specific constructions for specific types of canonical falls, the other toward detailed description of less canonical falls where signers are free to focus on those aspects of the fall that they find relevant.

The consensus as regards the descriptions of the typical falls could be interpreted as evidence that the signers described the episodes by means of morphologically complex constructions and happened to choose the same morphemes. If the constructions were constructed productively from a large inventory of morphemes at the moment of signing, we would, however, expect the signers to use different forms even when describing the same event, as evidenced by the variation in their descriptions of the untypical fall in episode 4. It is much more likely that the signers have at their disposal a number of fall signs for the most typical falls, distinguishing backward from nonbackward falls and vertical from horizontal falls. These conventional signs can combine with different Ground-representations in the form of the nondominant hand, some part of their body, or a locus. Because of the iconic character of these signs, the signers can also construct more or less novel signs to describe unusual fall events. As they may choose different perspectives on the unusual fall event, their creatively composed signs for one and the same event differ.

All aspects of the constructions that involve different positions in space and the spatial relationship between the articulators including the signer's head and body are non-discrete. Loci only stand out as significant in contrast to other loci in a specific context. Whether signers use a locus for the Ground or their body or head to represent the Ground, or whether they make the sign where it is convenient or assimilate the position of the articulator to the position of the articulator of the preceding sign can only be determined in context. The differences between the signer's forehead, top, and back of the head may be significant in some contexts, but they can be ignored when they are not considered relevant.

The differences between forward and backward falls and horizontal and vertical falls are expressed by differences in the articulator's orientation and direction of movement and differences in its start and end position. These aspects of the signs can be changed gradually with nondiscrete transitions. The adult signers' fall signs in the frog stories indicate, however, that for typical falls, signers use conventional signs with distinct forms.

The Child Forms

The youngest children in the study tend to use the standard sign FALL: the nondominant hand is held in neutral space, palm up, the dominant V-hand starts from a position with the fingertips touching the palm of the nondominant hand, moves up, turns around, and comes down to contact between the back of the dominant hand and the palm of the nondominant hand. This form includes all the aspects that can be altered to give the signs used by all the adults: the handforms, the path movement, the orientation of the articulator, and the direction of movement. The 20 frog stories elicited from children in this study demonstrate that the children move gradually toward the adult conventional forms, but also show signs of realizing that the aspects can be used creatively.

Use of Handforms, Loci, and the Signer's Head. As the youngest children's forms are unanalysed wholes, I use the term *handform* rather than *classifier* to denote the manual articulators in the children's fall constructions. The handforms used by the children that are equivalent to the adult signers' classifiers for the Figure appear in Table 15.5. [14]

As can be seen, the children use the V-hand[15] overwhelmingly. Of the 15 stories from children below the age of 8;4, only three distinguish the beehive from the animate beings, although the five oldest children all do so. This pattern confirms the status of the V-hand—a generalization of the classifier for human beings—as the neutral handform of signs denoting 'fall'. It could be expected that children would start substituting the handform of the standard sign to describe other kinds of Figures falling than human beings before changing the movement or orientation of the hand, because the handforms, being discrete, seem more conspicuous than the movement and orientation aspects of the signs. This expectation is not confirmed by the data of this study.

Three children use two flat hands (B) or flat hands with the fingers spread (5) either instead of or supplementing a construction with the V-hand in descriptions of the boy's falls. The constructions with these handforms can be interpreted as articulations of FALL-BACKWARD or FALL-FORWARD because the children also move their body backward or forward. When the children use only one 5-hand or change the hand from V to 5 in the movement, it is less clear whether they intended FALL-BACKWARD or FALL-FORWARD or whether they use a child pronunciation of the V-handform.

The youngest child to make the distinction between the beehive and the animate entities is B6;9. His construction describing the fall of the beehive is interesting because it demonstrates particularly clearly how children may start breaking down wholes into smaller components. B6;9 uses a form with the nondominant flat hand, palm down, and the dominant cupped hand (C), the side of the little finger touching the back of the nondominant hand; the dominant hand moves over the edge of the nondominant hand and down. The form demonstrates that the boy is aware of the following aspects: (a) Surface (the flat hand is held palm down in contrast to the nondominant hand of the standard sign FALL); (b) Curved-entity use of the Figure, downward path (the dominant hand starts and ends at different levels); and (c) the requirement that the articulator does not change its orientation in descriptions of some falling entities. But in the adult language, the form that he produces means that something like a cup moves from a surface, over the edge and down without turning over. The relationship between the boy's dominant hand and his nondominant hand is of course wrong for a beehive hanging in a tree. As we shall see, the nondominant hand of the standard sign FALL only develops into the Ground-representing articulator of the adult signers' constructions in steps.

TABLE 15.5

Handforms for the Figure Used by the Children in the Descriptions of the Six Fall Episodes.*

	Ep. 1	*Ep. 2*	*Ep. 3*	*Ep. 4*	*Ep. 5*	*Ep. 6*
B6;6	V		V	V	V	V
G6;6	V		V		V	V
G6;7	V			5		V
B6;9	V	C	V	V	V, (2h)5	
Ba6;10	V		V	V	V	
Bb6;10		V	V	V	V	
B6;11	V	(2h)C	V	V->5	V	
G6;11	V	V	V	V	V	V
B7;0	V		V	V	V	
B7;6	V		V			V
G7;8	V	V	V	(2h)b,v	Index,V	
B7;11 (-B6;6)	V		V		V	
G7;11 (=G6;7)	V	(2h)C	V,(2h)5	V	V	
B8;0	V	V			V	V
B8;3 (=B6;10)	V	V	V		V	V
G8;4 (=G6;11)	V	(2h)C	V	V	V	V
B8;10	V	C	V	see text	V	
G9;2	V	C	V	V	V	
B9;3	V	(2h)C	V	V	V	
G9;3	V	(2h)C	V	see text	V	

*V = variants of a fist with extended, straight or slightly bent index and middle fingers, including handforms where the thumb is also extended. C = all fingers extended and bent, the thumb opposed (cf. Curved-entity). B = flat hand (cf. Hand). 5 = flat hand, fingers spread. (2h) = both hands with the same handform move. Episode 6 is left out because very few children used a fall construction about the dog's fall.

Table 15.6 lists the handforms equivalent of Ground classifiers used by the children.

On Table 15.6, 0 indicates that the child uses a fall sign with a V-handform in the dominant hand and no non-dominant hand. This is by far the most common version for almost all children up to the age of 8;4. Some of the children use other handforms in the nondominant hand than a flat hand. The youngest boy uses the handform of Animal in episode 4 in a description of how the boy falls down from a height and ends astride the deer that then runs off with him (the articulator for Animal with the articulator for Two-legged-entity on top is moved forward). This use of Animal is not seen in the adult language where the more conventional form for the nondominant hand would be the one found in RIDE-HORSEBACK, the flat hand, the side of the little finger down (cf. Liddell, chap. 9, this volume, for accidental gaps in classifier constructions). B8;10 uses the articulator for the classifier Tree to describe episode 2 in a construction that is fully acceptable in the adult language. Three children, B6;11, B8;10, and

TABLE 15.6

Handforms and the Head Used by the Children for the Ground in the Descriptions of the Six Fall Episodes.*

	Ep. 1	*Ep. 2*	*Ep. 3*	*Ep. 4*	*Ep. 5*	*Ep. 6*
B6;6	Bu		Bu(G)	V:G	Bu	
G6;6	Bu		Bu(G)	0	Bu	
G6;7	0			0		0
B6;9	Bi	Bd(S)	Bi	0	0	
Ba6;10	0		Bd(G)	Bd->Bu	Bi(S)	
Bb6;10			0	0	0	
B6;11	0		0	Bi(S)	head(S)	
G6;11	0	0	0	0	0	0
B7;0	0		0	Bd(G)	0	
B7;6	Bu(S)		Bu			Bu(G)
G7;8	0	Bi	0	Bi		Bi
B7;11 (-B6;6)	0		Bd(S)		0	
G7;11 (=g6;7)	0		5i(S)		0	
B8;0	0	0			0	0
B8;3 (-B6;10)	0	0	0		0	0
G8;4 (=g6;11)	0		0	Bi(G)	0	0
B8;10	0	5+forearm (S)	0		head(S)	
G9;2	Bd(G)		Bd	Bd	Bd(S)	
B9;3	0		5d(S)	5d	5d(S)	
G9;3	Sd(S)		0		head(S)	

*B = loose flat hand (cf. Surface); 5 = loose hand, fingers spread (cf. Surface); S = loose fist; V: = extended, bent index and middle fingers, the wrist is straight (cf. Animal); 5 + forearm = fingers spread, forearm and hand held vertically (cf. Tree); u = palm up; i = palm toward the body; d = palm down; 0 = use of a V (or 5) handform for the Figure, but no handform for the Ground; head = use of own head to represent the deer's head. (S) indicates use of the handform for the source; (G) indicates use of the handform for the goal. In the rest of cases, the dominant hand starts and ends on the nondominant hand.

G9;3, use their head to represent the deer's head in episode 5, again in accordance with the adult use. All the remaining nondominant handforms are variants of the B- or 5-hand. None of the children use a locus for the Ground.

In the standard sign, FALL, the B-hand is palm up while Surface is made with the flat hand, palm down.[16] Except for Ba6;10,[17] the youngest children use the B-hand with the palm up or turned inward toward their body. In the middle group, there is some variation between palm up and palm down, whereas the three oldest children all use B or 5 with the palm down. Thus there is a clear development from the flat hand as part of the standard sign to a flat hand as part of a different construction. But what constitutes the nondominant hand as Surface in a classifier construction is not only palm orientation, but also its representation of either the source or the goal alone

when they differ, and then primarily the source.[18] Some of the children, e.g., B6;6 and G6;6 in episode 5, distinguish source from goal in the movement without changing the orientation of the nondominant hand, while G9;2 erroneously changes its orientation to palm down in episodes 3 and 4, but starts and ends the movement on the nondominant hand.

Vertical Versus Horizontal Versus Backward Falls. If the standard sign FALL is broken into its parts, it iconically represents a fall of an upright, two-legged individual who moves upward, turns over in a twisting movement in midair, and ends lying face down in the same place as at the start. The analysis of the children's forms that appears in Table 15.7 demonstrates that especially some of the younger children use this form, but a remarkable number of forms iconically represent a sideways, horizontal fall ('hor., yes, side' in Table 15.7), i.e., the hand starts at a certain level, moves up, twists to palm up, and comes down further to the side at the same level as its starting point. None of the adults move the hand sideways. The first distinction that the children make is thus the distinction between the start and the end position of the movement. Such a distinction is one of the two main features in establishing the nondominant hand as not only a submorphemic part of the standard sign, but expression of the Ground-denoting classifier, Surface, in descriptions of falls where the falling entity does not end up in the same place as it starts. The second feature is changing the orientation of the nondominant hand to palm down. The younger children, thus, focus more on differences in start and end position of the fall than on characteristics of the Figure (differences in handform) or the Ground (change of orientation to palm down or use of a different handform). The direction of movement, forward or backward, and the distinction between a vertical fall and a horizontal fall (path of movement) is generally ignored by the younger children.

The path movement is especially relevant in distinguishing the boy's movement onto the deer in episode 4 from the other falls. Quite a number of children here use a horizontal movement, i.e., a movement without a change in start and end level, but most of these children also use a horizontal movement for the other falls. Three children, B6;6, B6;9, and G8;4, even use a vertical, downward movement for episode 4 and a horizontal movement for all other falls. It is as if they have a horizontal standard for falls in general, but feel that the noncanonical fall in episode 4 calls for something different, which becomes a downward movement of the hand without any change of orientation. Of the four oldest children, B8;10 and G9;3 use two hands as if holding branches and move them upward and forward to describe how the boy got onto the deer's head, a construction also used by signer A. One boy, B9;3, demonstrates that he has left the standard sign FALL behind in his descriptions of the other falls than the one in episode 4; he makes vertical path movements in the forward direction. But when confronted with the difficult episode 4, he reverts to the standard sign FALL. One girl among the oldest children, G9;2, uses a form without a path movement; she holds her dominant hand with the V-form, fingertips touching the back of the nondominant hand, and changes its orientation to fingertips pointing inward, a form similar to signer D's. The older children thus all demonstrate that they perceive the motion in episode 4 as different from the falls in the other episodes. Only one child manages to use an adult, more creative form based on Two-legged-entity. B9;3 gives up and uses the standard sign, having apparently only gone part of the way in breaking down the standard sign into units that can be manipulated linguistically or iconically.

The adult signers use the direction of movement to distinguish the forward falls from the backward fall in episode 3. As mentioned, the younger children tend to use a sideways movement of the hand no matter the direction of the fall, but Table 15.7 demonstrates that the older children are more likely to use a forward direction of movement. Only five children distinguish

TABLE 15.7

The Movement Aspects of the Fall Constructions Used by the Children.*

	Path Movement				*Orientation Change*				*Direction of Movement*			
Signers	1	3	4	5	1	3	4	5	1	3	4	5
B6;6	-	vert.	vert.		yes	no	no	yes	-	down	down	
G6;6	-	vert.	vert.		yes	yes	no	yes	-	down	up	-
G6;7	hor.		hor.		yes		yes		side		side	
B6;9	hor.	hor.	vert.	hor.	yes	yes	no	yes	side	side	down	side
Ba6;10	-	hor.	-	hor.	yes	no	yes	yes	-	back	forw.	side
Bb6;10		vert.	hor.	vert.		yes	yes	yes		down	forw.	down
B6;11	hor.	hor.	hor.	vert.	no	yes	yes	yes	forw.	side	side	forw.
G6;11	hor.	hor.	hor.	hor.	yes	yes	no	yes	side	side	forw.	side
B7;0	hor.	hor.	hor.	hor.	yes	yes	yes	yes	side	side	forw.	side
B7;6	hor.	hor.		vert.	yes	yes		no	forw.	back		down
G7;8	hor.	hor.	hor.		yes	yes	yes		side	side	forw.	
B7;11	hor.	hor.		hor.	yes	yes		yes	side	side		side
G7;11	hor.	hor.	hor.	hor.	yes	yes	no	yes	forw.	side	forw.	forw.
B8;0	hor.			hor.	yes			yes	side			side
B8;3	vert.	-		vert.	yes	yes		yes	down	-		forw.
G8;4	hor.	hor.	vert.	hor.	yes	yes	no	yes	side	side	down	side
B8;10	vert.	hor.		vert.	no	yes		yes	forw.	back		forw.
G9;2	vert.	hor.	-	vert.	yes	yes	yes	yes	down	back	forw.	forw.
B9;3	vert.	vert.	-	vert.	yes	yes	yes	yes	forw.	forw.	-	forw.
G9;3	hor.	hor.		vert.	yes	yes		yes	forw.	back		forw.

*1 (dog from window sill), 3 (boy from tree), 4 (boy from rock onto deer), and 5 (boy from deer to pond). Horiz. = Horizontal, the hand starts and ends at two different position on the same horizontal level; vert.= Vertical, the hand starts on a higher level than it ends; - = the hand starts and ends at the same position (in most cases the standard sign FALL with a nondominant handform); back = backward, the hand moves inward toward the signer; forw. = forward, the hand moves forward from the signer; side = the hand moves on a vertical plane parallel with the signer's body; down = the hand moves from a higher to a lower position on a vertical plane parallel with the signer's body (always vertical path movement).

the backward fall clearly from other falls. A boy as young as 6;10 makes variants of the standard sign with and without the nondominant hand to describe the vertical falls except for the boy's backward fall from the tree. Here he moves the articulator inward toward his body in two versions, one with the nondominant flat hand as the end point of the movement. Except for the awkward use of the nondominant hand as representing the goal of the motion event and the lack of a difference in level between the dominant hand's starting and end points, the movement and orientation of the dominant hand is identical with adult use. Of the four other children who move the articulator inward toward their body, three belong to the oldest group. All the children describe the backward fall as a horizontal fall like signer D.[19] The reason may be either that they focus on the direction of the fall (backward), ignoring the path, or that they are not capable of

integrating both the backward direction of movement and the difference in beginning and end level in one construction.

The change of the articulator's orientation is the one most stable aspect of signs denoting 'fall' with Two-legged-entity. As could be expected, no less than six children do not change the articulator's orientation in their descriptions of the boy's movement onto the deer in episode 4. Focusing on the boy's end position, B6;9 and G6;11 produce forms with the fingers of the V-hand held horizontally. One adult signer, A, also holds her hand horizontally. B6;6 and G8;4 use V-hands with the fingers pointing downward and make the dominant V-hand end astride the nondominant hand. The preceding signs are DEER and BOY, respectively, i.e., signs made on the head. The V-handform thus comes from above the nondominant hand, and the constructions may denote either that the boy jumped onto the deer or that he was astride the deer as it is not clear whether the downward movement is a transition movement or part of the sign. B6;9 and G6;11, on one hand, and B6;6 and G8;4, on the other hand, construe differently the boy's relationship to the deer. The former describe him as lying on the deer, the latter as riding astride it. B6;9 and G6;11 both otherwise use the standard sign FALL with horizontal, sideway movement and a change of the articulator's orientation. Their forms for the boy's motion in episode 4 demonstrate that they see the articulator's change of orientation as significant in descriptions of canonical falls and the V-hand as an iconic representation of a two-legged entity. They still have not acquired the conventional signs for typical falls, but they have started seeing the iconic possibilities and combine the aspects in novel forms as evidenced especially by B6;6's—from an adult point of view—problematic construction with the articulator for Two-legged-entity astride the articulator for Animal.

Summing up, the children's data demonstrate that they, contrary to what could be expected, do not first focus on the Figure of the fall event. Of the eight children below the age of 8;3 who mention episode 2, five use the V-handform for the beehive and only three the appropriate handform from an adult point of view. The children's forms are primarily approximations to the different standardized adult fall signs, i.e., FALL-BACKWARD and FALL-FORWARD with flat hands, signs in which the nondominant hand, palm down, constitutes the starting point of the movement, and signs with Two-legged-entity that distinguish forward or nonbackward falls from backward falls. A number of constructions produced by the children also demonstrate that they have started breaking down the forms they see, and use, in smaller components that can be combined creatively. Because the forms are deviant from an adult point of view, the creativity is especially clear in B6;9's construction describing the beehive as falling down from a flat surface and B6;6's use of the handform expressing Animal as the end point of the dominant hand's movement in his description of episode 4.

Shifted Attribution of Expressive Elements. Although many of the children use affective facial expressions that indicate the characters' feelings, only four children do so with the constructions describing the fall events. The youngest child, a girl of 6;11, blinks her eyes and nods her head as if startled while signing that the boy fell onto the deer. All the other examples of expressions of affect occur in the children's descriptions of episode 3, the boy's fall from the tree, the event on which the adult signers take a close-up perspective. The three children who express the boy's feelings in their descriptions of episode 3, are the children with other deaf family members. G7;11, who has a deaf older brother, first uses a variant of the standard sign and then the form FALL-BACKWARD while looking frightened. B8;10 and G9;2, who have deaf parents, combine the facial expression of affect with constructions with Two-legged-entity and a backward direction of movement.

HOW DECOMPOSABLE IS A FALL?

Returning to the questions asked in the introduction, we may conclude that the meaningfulness of the aspects of the signs that involve space or the spatial relationship between the hand and the signer's head or body is based on analogy, as claimed by Liddell (1990, 1995, 1996, 2000). The transition point between one meaning and another cannot be determined when the expression is changed gradually. And what is more, whether the spatial location of the hand making the sign is significant or not can only be interpreted in context.

The consensus among the adult signers is highest in their descriptions of canonical falls, i.e., human beings falling from a higher to a lower level. The standard sign FALL based on a Two-legged-entity is not used by any of the adult signers in the data, where the context—retelling a story—requires semantically more specific signs. The similarity between the adult signs describing episodes 1, 2, 3, 5, and 6 indicates, however, the existence of ready-made, conventional, ways of distinguishing typical falls such as a human being's vertical fall forward or backward. The extent to which these lexicalized units can be analyzed into morphemes, whether the sign denoting a human being's vertical fall forward consists of one or more morphemes, depends on the individual language user as does derivational morphology in spoken languages (cf. Liddell, chap. 9, this volume). The analyzability cannot be determined on the basis of the kind of data presented here.

The difficulty of determining the size of the productive units is well-known from West-Greenlandic, a polysynthetic language with extensive derivation and morphophonological processes that obscure morpheme boundaries (Fortescue, 1980). Speakers of West-Greenlandic often disagree on the size and identity of derivational affixes and children use what from adult speakers' point of view are combinations of individual affixes apparently as unanalysable units (Fortescue & Lennert Olsen, 1992; see also Fortescue 1984/1985 on productivity).

The standard sign FALL is the children's point of departure in the development of the fall signs seen in this study. Many of the children's forms are best analyzed as approximations from FALL to the more specific standard signs rather than as attempts at combining smaller units productively. The children produce forms that make sense as intermediate stages between FALL and the more specific, conventional adult signs, but not as constructions formed productively of smaller meaningful units. They use a sideway movement as the first indication of a distinction between the falling entity's start and end point. The sideway movement is not seen in the adult signs and is not separately meaningful in the children's signs because the hand is moved sideway and starts and ends at the same level in descriptions of the boy's and the dog's forward or backward falls and the fall of the beehive from the tree.[20] The sideway movement with the difference in the articulator's start and end position is a first step in what makes the nondominant hand eventually represent the Ground, however. The next step in the approximation to the adult conventional signs is the change in orientation of the nondominant hand, again a feature that is not separately meaningful, but makes the signs look more like the adult, semantically specific fall signs. Thus the children's forms in this study are not organized from the beginning in terms of discrete morphemes (cf. Supalla, 1982).

The hesitation phenomena seen in the adult data and the lack of consensus as regards the descriptions of the untypical fall in episode 4 indicate that the forms describing this episode are productively formed. The signers focus on different aspects of the boy's movement onto the deer. Some of the children also use productively formed signs. This is particularly clear when they make signs that are highly unconventional or even unacceptable according to the adult norm such as B6;6's use of the nondominant hand with the articulator for Animal in a construction describing how the boy ends up astride the deer that runs off, and B6;9's description of the

beehive's fall. From a linguistic point of view, there is no clear boundary between lexical sign verbs and productively formed classifier constructions; both types can be broken down into the same types of components. The standard fall signs only stand out as larger lexicalized units because they are more frequently used than the signs used to describe episode 4. In processing, however, signers must make decisions as to whether to choose among the lexicalized possibilities offered by the language or to construct novel forms.

Should the productively formed signs used by some of the children and by the adults in particularly in descriptions of episode 4 be described in terms of morphemes or in terms of visual representation? B6;9's description of the fall of the beehive as if it falls from on top of a flat surface is far from iconic, but indicates that he has started analyzing the adult forms as possibly consisting of smaller meaningful parts. When letting the dominant hand articulating Curved-entity start on top of the nondominant flat hand, palm down, he uses parts of the conventional, semantically more specific, fall signs productively. In these signs, adults use the nondominant flat hand, palm down, to represent the surface on which the falling entity is placed before the fall, but of course this form is unacceptable for the branch under which the beehive is hanging before its fall. B9;3 approaches adult conventional forms in all episodes except episode 4. For this episode he reverts to the standard sign FALL. He may not even be sensitive to the fact that the forms he has acquired can be broken down into smaller iconic or noniconic units, but may have acquired the semantically more specific fall signs as unanalysed units. By contrast, signer D's use of her own legs combined with a handform representing the deer's head in her description of episode 4 is evidence that adult signers are aware of the iconic possibilities of the conventional forms.

Slobin et al. (Chap. 13, this volume) and Ellenberger and Steyaert (1978) demonstrated that early learners make use of iconic, nonconventional articulation in describing motion events. However, the iconic gestures used by the children in their studies are mimelike in that the hands represent hands, the head a head, etc., of one individual. In her description of episode 4, signer D represents the deer's head by means of her hand and the boy's legs by means of her own legs, thus combining representations of two separate individuals in her own body. This is by far more sophisticated and probably requires more analysis of the conventional constructions used to describe motion events in a sign language. The present study indicates a period where children acquring a sign language are concerned with mastering the conventional signs and learning to manipulate the meaningful units productively. Future studies should focus on the interaction of full lexicalized forms, sublexical meaningful units, and gesturelike, iconic forms in adults' signed discourse as well as in the ontogenetic development.

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ENDNOTES

[1] I have argued against the use of this term borrowed from spoken language linguistics in the analysis of the particular constructions at issue (Engberg-Pedersen, 1993, pp. 235–254). I compared the constructions with the classificatory verbs of Koyukon where the choice of verb stem is influenced by characteristics of the Figure (Talmy, 1985). In 1993, I described—somewhat hesitatingly—the unit expressed by the handform as the *stem* of

the verb. As I have become increasingly in doubt about this analysis (see also Schembri, chap. 1, this volume) and as my focus in this chapter is not on the proper analysis of the unit expressed by the handform separately, I use the term *classifier* here.

[2] For a related analysis of lexicalized meaning of "person classifiers" in Danish Sign Language, see Engberg-Pedersen, 1993, pp. 246–251.

[3] Liddell (chap. 9, this volume) mentions a case where a signer described the fact that a security chain on a door was not attached. The signer produced a sign in which the index finger was oriented downward and swinging back and forth. The point was that the chain was not attached to the door, not that it was swinging back and forth. Liddell interprets this "semantic idiosyncrasy" as suggesting that the sign is a lexical form. Without judging the current case, I think that we should leave open the possibility that signers on the spur of the moment can create classifier constructions based on the iconic possibilities of the language and general metonymic—and possibly metaphoric—means of characterizing one situation by means of another. An index finger held vertically can be interpreted in too many ways to be useful in the situation described, whereas the chain's potential for swinging can be used metonymically to describe the fact that it was unattached.

[4] The number of deaf children with deaf parents in the study may seem low, but with the Danish population of 5 million, this is the number of children with deaf parents that can be expected in the group of children between 6 and 10 years in the School for the Deaf in Copenhagen. The school, which was established in 1807, attracts deaf children from about 1/3 of the population.

[5] I have included an episode where the protagonist, a boy, is on top of a rock holding onto what he believes to be branches but turn out to be a deer's antlers. When the deer gets up from behind the rock, the boy ends up on the deer's head. This episode can be described as caused by the deer's action (*The deer lifted the boy up*) or as something that happens to the boy (*The boy got onto the deer*) (Jansen, 1999; David Wilkins, personal communication, April 2000). In the stories in this study, almost all the signers use the same classifier as for the protagonist's falls; only two children use a different form. Moreover, the adult fall constructions generally include a change of orientation of the hand. The change of orientation recurs in three out of four adult descriptions of the boy's "fall" onto the deer's head. Strictly speaking, when the boy moves from the rock onto the deer, he ends up at a higher level, a fact that is described in the constructions by some of the adult signers and by the two children who do not use the same classifier as the other signers. The adult signers all describe the movement as horizontal, and I thus describe the "fall" in episode 4 as *the horizontal fall* in contrast to all the other—vertical—falls.

[6] Roughly, the expression of signs can be described in terms of one or two hands with a particular shape or form (e.g., an index hand, a flat hand, a fist with extended index and middle fingers) and a particular orientation, moved in a particular way at some location in space or near or on the head, face, body, or opposite arm. In classifier constructions of the type described in this chapter, the handform represents the Figure involved in the event more or less iconically.

[7] In some classifier constructions, both hands move; neither can be described as representing the Ground. In other constructions not represented in this study, the articulator representing the Ground moves while the articulator representing the Figure is motionless (described as *perceived motion* by Lucas & Valli, 1990).

[8] It is not yet clear whether this is one verb with a number of variants or several distinct lexemes, a problem that will recur in this chapter.

[9] I use *aspects of the constructions* rather loosely to indicate the parts of the construction analyzed here, regardless of their status as individually meaningful or not. Classifiers are named by words starting with a capital and hyphened if more than one word is used (e.g., Two-legged-entity, Animal, Tree).

[10] Emmorey (1999) describes a similar use of the hands in an ASL version of the frog story as a manual gesture in contrast to classifier predicates, although acknowledging the difficulty of determining the difference.

[11] Berman and Slobin (1994) discussed differences in perspective in frog stories expressed through differences in argument choice, voice, valency, and word order. In the signed fall constructions, the differences in perspective rather concern lexical choice and choices made within complex classifier constructions (cf. the analysis of descriptions of episode 4 below).

[12] Native signers claim that the direction in which the fingers point at the end of the movement is not significant.

[13] Signer C describes episode 1 as the dog jumping out of the window. Her construction is omitted here.

[14] Based on a test of ASL-signing children's classifiers, Schick (1990) concluded that "the acquisition of handform morphemes is not significantly related to age for children older than four and a half" (1990, p. 370). This may also be true of children acquiring Danish Sign Language. But as demonstrated by the adult signers' con-

structions, the choice of classifier depends on the entirety of the construction and the perspective on the event. Moreover, there is a long way from picking out the right handform to represent an entity to being able to integrate classifiers in appropriate constructions in contextually appropriate ways (cf. Slobin et al., chap. 13, this volume).

[15] Some children use a child pronunciation of the V-handform: they extend the thumb (3-handform) or all fingers (5-handform).

[16] A flat hand, palm up, may be a different classifier in the non-dominant hand, e.g. a classifier for a surf board.

[17] Ba6;10 makes most of his signs very close to the book, pointing at the drawings to refer to the participants. His non-dominant hand is held as a loose fist, palm down, most of the time. It thus seems somewhat accidental that he appears to have acquired the mature form flat hand, palm down.

[18] This interdependence of the orientation of the nondominant hand and the start and end position of the dominant hand in constituting the nondominant hand as an articulator for Surface presents problems for a morphological analysis of the children's acquisition of the constructions. In his analysis of children's acquisition of morphemes of classifier verbs, one by one, Supalla (1982) ignored the interdependence of the different aspects of the entire construction.

[19] Native signers claim that there is a difference between a form where the hand ends at the same level as its starting point and a form where it moves to a lower level in descriptions of backward falls. It is, however, worth investigating to what extent the difference is maintained in use, as the hand moves toward the body and may be prevented from moving farther down.

[20] Native adult signers claim that they could describe someone falling sideway by means of a sideway movement of the hand, but contrary to the children, they bend the index and middle fingers in the movement and end with the side of the little finger facing downward. The children's articulators end with the palm up as in the adult conventional forms for 'fall forward', not 'fall sideway'.

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